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[E. Franklin photo

Penny and Sally Agar and their wire-haired friend Wittie are determined to present a clean bill of health to the newly formed Hydatids Control Council. Sally finds the patient in good heart; Penny pronounces a verdict of "hot dog"; and the photographer cannot distract a healthy dog's interest from her plate.

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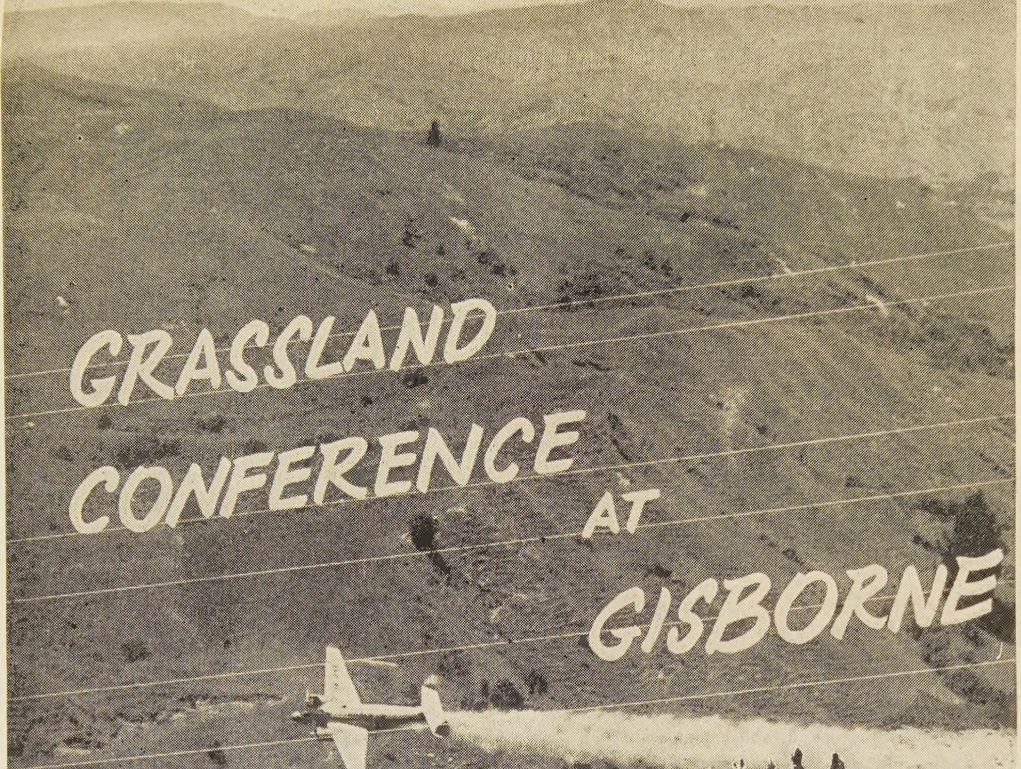
GRASSLAND CONFERENCE AT GISBORNE



◀ Aerial topdressing has become the key to practical rejuvenation of three-quarters of the two million acres of grass in the Gisborne-East Coast district that is on steep, unploughable hill country. A demonstration drop of a $3\frac{1}{2}$-ton load of superphosphate by Lodestar 'plane on Papatu Station shows how in this high rainfall area grass is being encouraged to assume the additional role of stabiliser, so that land highly subject to erosion can be kept in production.

▼ Part of the field day at 1,100 ft elevation and only 15 miles from the sea, where an extreme erosion problem was inspected at Waerenga-okuri Soil Conservation Reserve and management of Papatu Station, a large hill country property, was discussed.

CONFERENCES of the New Zealand Grassland Association have come to be regarded as perhaps the best opportunity during the farming year for all with interests in the many phases of agricultural production to meet as nearly as possible on common ground. Reciprocal benefits to both the visitors and the hosts have generally been evident and have been emphasised as a prime aim and product of the conferences. In this respect the Association's 21st conference at Gisborne in December seemed to be a little out of pattern.

PERHAPS because the Gisborne-East Coast district has some special problems of its own, which assumed a dominant place on the programme, particularly of the field day, the interest of visitors seemed to be more catered for than that of local farmers. As a result any achievements of the conference appeared to drift a little away from the declared target of the Association on its foundation in 1931, "the improvement of grasslands for the permanent benefit of New Zealand", and attendances were below those at other centres in recent years.

WHETHER or not the papers and discussions, both formal and informal, of the conference brought any extensive benefits to the district, there could be no doubt of the warmth of the local welcome to the conference visitors and of the determination of the hosts to ensure a high standard of hospitality and entertainment and a thorough introduction to the district's farming affairs and problems.

Research Worker-Farmer Contacts

In officially opening the conference Mr R. A. Keeling, M.P., referred to the importance of maintaining the field of contacts between research workers in agriculture and farmers. Though it had been necessary for the Department of Agriculture, in the interests of efficient continuance of its research programme, to curtail somewhat the attendance of research officers at farm schools and other smaller district gatherings, they would still be encouraged to participate in conferences of a national character, and the wider basis of extension services would ensure the translation of the findings of research in soils, pastures, and the grazing animal to farming practice as quickly as possible.

Research workers, said Mr Keeling, had recently produced some outstanding results affecting major problems of grassland farming such as facial eczema and bloat. Field trials by extension workers were proving the possibilities of the practical application of new techniques such as "chemical ploughing"; and farmers, served by keen and efficient advisory services, were quick to avail themselves of new aids to efficiency.

Because of the small number of graduates coming from the agricultural colleges it had been difficult to provide the increased extension services needed, but more recruits were likely to be available in the next few years, and Poverty Bay, with its special problems, could be expected to have more farm advisory officers. The Department of Agriculture had recently established an additional officer at Ruatoria to give more specific attention to the pressing problems of soil conservation and hill country development in the Matakaoa and Waiapu Counties.

Special District Problems

"You will find in this district much that is of interest, but I regret to say that you will also see many things that, despite the many advances made in grassland science, are still a problem; but in spite of this we have made remarkable progress.

"We claim to have some of the best land in New Zealand, but we also have some of the worst soil erosion. Much of our land is difficult to work, the soils are often unstable, and although our climate is a very pleasant one to live in, occasional heavy rains in some of the back country tend to aggravate our difficulties in controlling run-off in our catchment areas.

"Realising that such problems could be tackled only by concerted effort, Poverty Bay was one of the first districts to set up a Catchment Board and this has enabled us to deal more effectively with some of our troublesome rivers. We are hoping that, by paying attention to their headwaters, land improvement will be put on a permanent basis, and it is largely by attention to proper grassland management that this will be accomplished.

"Aerial topdressing, which has been a great boon to this district, as it has to most of the hill country of the East Coast, has assisted considerably in the improvement of pastures and the healing of slips.

"Protection from flooding of the lower fertile valley lands has encouraged much more intensive utilisation with crops for canning and fruit and vegetable growing. Increased productivity and land values have reflected this new security.

"As these lands are moderately to very fertile, and the climate so favourable, they respond to fertilisers and good management sufficiently to ensure a profitable partnership of conservation and increased production."

Of the two million acres in grass in the Gisborne-East Coast area, acreage topdressed had risen from 60,000 in 1938 to 200,000, but stock units carried had not increased correspondingly, partly because of erosion, partly because of Maori lands deterioration, and partly because farming methods had not yet advanced to the stage they had in more accessible districts.

Trace element deficiencies, principally of copper and boron, had been revealed in some soils by Department of Agriculture trials. Three cooperative demonstration farms, the development costs of which were being assisted by the Department, were being used to study the effects of closer subdivision, controlled grazing, and topdressing, and to demonstrate the advantages of these practices in an effort to encourage farmers to improve their management and thus lift production levels.

Crop research included the testing of American hybrid maize and the breeding by the Department of Agriculture of two high-producing hybrid strains in Gisborne. Average yields had, as a result, been raised 30 bushels per acre.

In a predominantly livestock farming district, local farmers were particularly interested, said Mr Keeling, in advances being made in study of some of the major animal problems that affect so closely the efficiency of farming on their types of country. Contributions of animal research workers to solutions of their problems of goitre in lambs, foot-rot, hogget ill thrift, and ewe fertility, and results from study of inheritance factors in rate of growth of beef cattle and the effects of cobalt, copper, and selenium in the nutrition of grazing animals, had been particularly appreciated.

Left to right—Mr R. A. Keeling, M.P., Mr S. D. Reeves, Dr P. D. Sears, president-elect, and Mr C. E. Iversen, president.

"The general effect of your Association's holding its conferences at various centres throughout the country seems to have been an immediate 'shot in the arm' for local farming, the effects of which have been evident later in a continuing intenser interest in the ideals for which your organisation stands," said Mr Keeling. "I am sure it would be to both the district's and the national advantage if a similar result were to follow your visit here. I am sure, too, that I will be expressing the wishes of all the people of the district when I hope that you will find your visit so worth while that we will not have to wait so long for you to come again."

Practicable Solutions Wanted

The importance of grass as a crop was discussed by Mr S. D. Reeves, President of Federated Farmers (N.Z.) and of the Gisborne Province of that organisation, in welcoming delegates on behalf of farmers. It was a good thing for all interests, those of the town and country, and of the farmer and the scientist, to get together at such a conference. "One of the things you are trying to do and we as a farmers' organisation are trying to do is to convince the people of New Zealand that our prosperity rests on grass."

Future Conferences

The next conference is to be held in Invercargill toward the end of 1960. Tauranga, with the alternative of New Plymouth, has been recommended for consideration for the 1961 conference.

Mr A. H. Cockayne, the father of grassland farming in New Zealand, had remarked in 1919 that "South Island farmers say North Island farmers don't farm—they just grow grass," and had forecast the great change that would occur in the attitude toward grass, said Mr Reeves. Progress made in the 40 years since then reflected great credit on the people who had done the technical work on grass production and on those who had carried their message to farmers.

Those who were working on the major problems, such as facial eczema, hogget ill thrift, and bloat, that still had to be solved should bear in mind that it was important to farmers not only that the problems be solved but that the solutions be practicable.

"We have had solutions that are not economic; we have also had suggestions of changes in farm management that are not economic. If I have one criticism," said Mr Reeves, "it is that some recommendations are not practical economics. The capital required for farming today is much greater than when I started to farm, and taxation takes a greater proportion. If technical and scientific workers keep this thought always in mind, they will have the gratitude of the people I represent."

Agriculture in N.Z. Economy

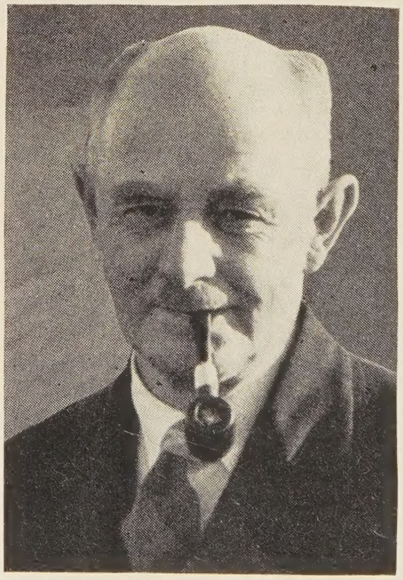
The question whether the Grassland Association should change the objective of its 28 years' activities—the improvement of grassland—was discussed by Mr C. E. Iversen in his presidential address to the conference, in which he covered the potential labour force for farming and industry, prospects for our main lines of primary production, and agricultural education.

"Many responsible people are beginning to wonder if it is wise to go on expanding our agriculture and to question the wisdom of continuing land development. Much has been heard of 'diversification', of the danger of 'having all our eggs in one basket', and of the starting of industries to employ our surplus population," said Mr Iversen.

Death of Mr C. J. Hamblyn, Grassland Association Award Winner

THE death occurred suddenly at Gisborne on 3 December of Mr C. J. Hamblyn, Fields Superintendent of the Department of Agriculture at Palmerston North, shortly after he had received the New Zealand Grassland Association's annual award for outstanding contribution to the betterment of grassland farming in New Zealand.

Mr Hamblyn had been engaged in extension work with the Department of Agriculture since 1924 and was a vigorous advocate of pasture improvement and of many outstanding changes in pastoral practices that have contributed substantially to increased production. He was one of the first to see the possibilities of grassing the second-class soils of North Auckland and recognised the value of basic slag in that area before the discovery of the need for molybdenum there. He was a staunch advocate of subterranean clover in the Manawatu and East Coast when the value of this species as a light land pioneer was first discovered. He was a crusader for mob stocking and the periodic spelling of hill country pastures to benefit the sward and the animal.



Mr C. J. Hamblyn.

After serving as an Instructor in Agriculture at Whangarei for many years Mr Hamblyn was appointed to Palmerston North as Fields Superintendent, in which capacity he gave to many farmers and extension officers the benefit of his wide experience.

Mr Hamblyn had taken his usual prominent part in the Gisborne conference of the Grassland Association, of which he was an executive committee member, and his knowledge of the district, which came within his fields superintendency, enabled him to add much to the interest of the field day.

In acknowledging the honour of receiving the Grassland Association's award, Mr Hamblyn said it was one of the happiest moments of his professional life. He paid tribute to the workers in grassland and animal production who had been so helpful in his career and referred to the great pleasure and honour it had been to work in New Zealand with a very large number of farmers, whom he mentioned last but thought of first.

The wide regard in which Mr Hamblyn was held was evident in the large attendance, representative of all interests associated with agricultural production, at his funeral in Palmerston North.

Potential Workers in Agriculture

The present expanded school population, when it reached the labour market shortly, would consist of 18,000 boys per annum.

Of these about 3,000 would be absorbed into farming and 6,000 would enter occupations servicing farming or processing farm products.

It was obvious that for the remaining half we must develop a greater industrial potential than we had at present.

In 1926 the farm labour force was 137,000. It reached a peak of 163,000 in 1935 and a low point of 125,000 during the war. It has slowly recovered to the 1926 figure of 137,000, where it stands today. At one time 25 per cent of our labour force was directly engaged in farming; today the figure is 16 per cent and the trend is toward 15 per cent. This very small farm labour force, with its extremely high output per man, is made possible by such efficient ancillary industries as transport firms and agricultural contractors.

"Can farming absorb more than 3,000?" asked Mr Iversen. "I believe it can in that there are at present too few labour units per 1,000 sheep or per 100 cows. Is the number small because of poor conditions for farm workers?

"Evidence given to the Consultative Committee on Agricultural Education suggested that for farm workers conditions of wages, holidays, living conditions, and amenities compared more than favourably with many avenues of employment in town.

"However, some further investigation of this problem is worth the attention of our farming leaders.

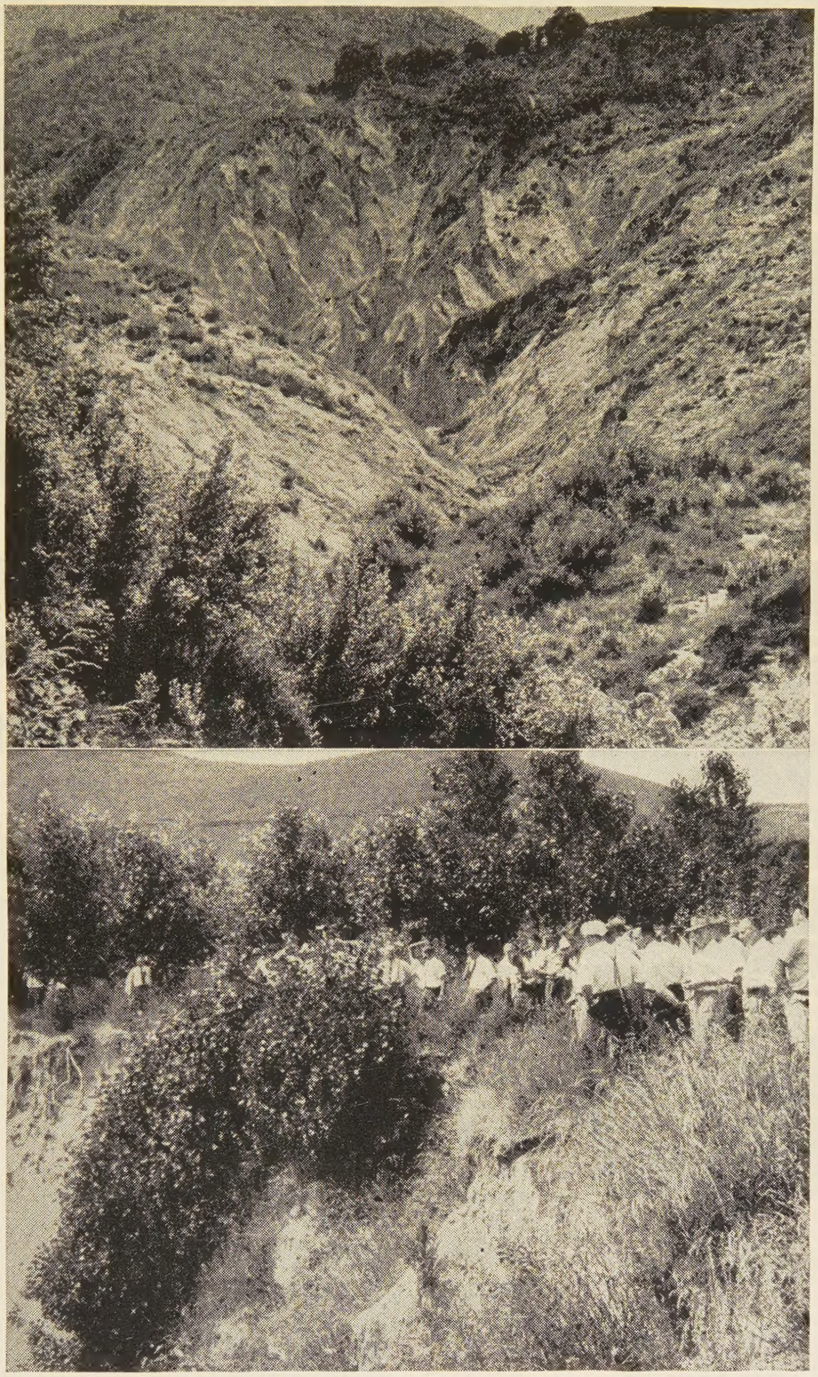
Agriculture or Industrialisation?

"Assuming that we can solve our problems of disposal of an increasing agricultural export, what are the relative merits at present of continuing to expand our agriculture vigorously or rushing headlong into industrialisation?

"A recent study of comparative productivity of agriculture and selected manufacturing industries shows that the net output per unit of labour employed in agriculture is £1,580 measured in terms of world prices. In manufacturing, net output is £963 per person measured in New Zealand prices, but only £378 measured in world prices.

"Any undue expansion of such manufacturing at the expense of agriculture can only be harmful to our standard of living. On these figures there is still room for expansion of agriculture.

"It should be realised in comparing these figures that agriculture is much less flexible in its labour demand than is manufacturing. A second man



Erosion at the Waerengaokuri Soil Conservation Reserve, described by Mr A. D. Todd, engineer of the Poverty Bay Catchment Board, as "not the sort of problem farmers have to deal with generally", was inspected during the field day. The gorge (upper) has been cut out of highly shattered soils on a large earthquake fault since 1920. In the lower illustration members view control measures from the edge of the extensive slumping, with, at rear, a plantation of the hybrid species of poplar that are being used to colonise the eroded slopes.

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added to a one-man farm does not increase the net product by a further £1,580, but by a figure nearer £500, whereas in manufacturing the additional man probably produces the same net output. However, if the two are compared in terms of world trade, agriculture still wins.

"What industries should we foster in New Zealand? The lesson from agriculture, where we have capitalised a natural resource, a favourable grassland climate, is patent."

South Island hydro-electric power, the iron sand industry, the paper and pulp industry, and the further processing of farm products were suggested by Mr Iversen as potentials worth consideration.

The criterion for judging new industries should be not the opportunity created by the vacuum of import control, but their relative productivity in terms of net output per unit of labour and capital.

We had a potential of development in agriculture of at least twice our present production.

"Part of this will come from the development of 3 million acres of scrub and other waste lands providing some 6,000 new farms. However, the greater part of the development must come from the improvement of exist-

Papers and Speakers

"Soils of the Gisborne-East Coast District and their Problems for Pastoral Use": H. S. Gibbs, Department of Scientific and Industrial Research, Wellington.

"Farming in Gisborne and East Coast Districts": H. de O. Chamberlain, Department of Agriculture, Gisborne.

"Crops for Canning and Deep Freezing": L. R. Renouf, J. Wattie Canneries, Gisborne.

"The Maori and his Land": V. Holst, Department of Maori Affairs, Gisborne.

"The Farming of Maori Lands": C. Goldsmith, Te Araroa.

"Soil Conservation in the Gisborne-East Coast District": A. D. Todd, Poverty Bay Catchment Board, Gisborne.

"Evaluation of Economic Aspects of Aerial Topdressing": C. P. Tebb, N.Z. Meat and Wool Boards' Economic Service, Hamilton.

"The Relationship Between Feed and Quantity and Kind of Wool Produced": A. E. Henderson, Canterbury Agricultural College, Lincoln.

"Pasture Improvement with Relation to Animal Disease": W. J. Hartley, Wallaceville Animal Research Station.'

"Nutrition of Grazing Sheep": L. R. Wallace, Ruakura Animal Research Station, Hamilton.

"Pasture Production Estimates by Measures other than Cutting": P. B. Lynch and N. S. Mountier, Department of Agriculture, Wellington.

"Results of Climate Studies and their Implications for Seasonal Productivity of Pastures": K. J. Mitchell, Department of Scientific and Industrial Research, Palmerston North.

"Perspectives in Pasture Plant Breeding in New Zealand": P. C. Barclay, Department of Scientific and Industrial Research, Palmerston North.

"The Evaluation of the Residual Effect of Phosphate on Permanent Pastures": J. Karlovsky, Rukuhia Soil Research Station, Hamilton.

Printed "Proceedings" of the conference will be posted to all members. Others may order copies (15s. each) from the Secretary, N.Z. Grassland Association, Box 2298, Wellington.

Special Award to Mr G. B. Baker

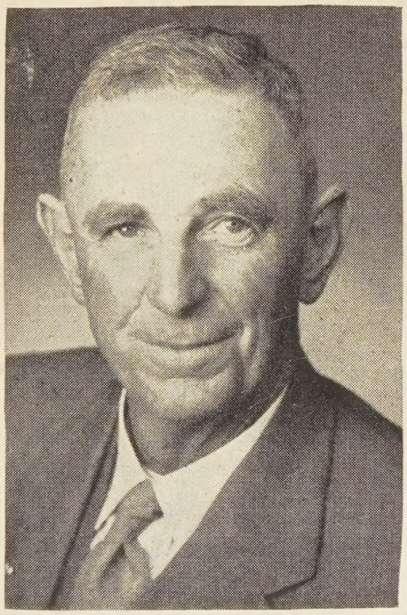
A SPECIAL award was made by the New Zealand Grassland Association at its conference in Gisborne in December to Mr G. B. Baker, chairman of the New Zealand Rabbit Destruction Council, "in recognition of his outstanding contribution to the betterment of grassland in New Zealand through his able leadership of the Rabbit Destruction Council in the undeviating maintenance of a policy which has been amply vindicated by the results achieved."

In acknowledging the privilege and great honour it had been to lead the very energetic body of eight men who comprised the council, Mr Baker said the actual killing had been done by the rabbit boards, by devoted men out to serve their fellows and their country in redeeming what was really our only basic natural asset, the land.

Without the assistance of the Department of Agriculture, and particularly the Animal Industry Division, the council and the boards would not have succeeded as they had.

Three main essentials to getting the rabbit pest to its irreducible minimum, said Mr Baker, were

1. Total devaluation. Any pest that had any value to anybody would never be eliminated.



[*Bremford*

Mr G. B. Baker.

2. Total coverage of all rabbit-infested areas in New Zealand, which had not yet been attained.
3. Adequate financial assistance for badly denuded and rabbit-infested country, which had been given by all three Governments during the council's operations.

The council's aims had been called fantastic, said Mr Baker, and those who supported its policy had been described as idealists and visionaries. "They are saying today that we will never get the last rabbit, but it is certainly not impossible. Some of us are quite sure it will be achieved.

"I look on this award as an honour conferred on the council as a whole and on the boards that have done so much in protecting our land from desolation."

Mr Baker, who after the First World War farmed a foothill property near Timaru for 35 years, has been associated with the South Canterbury Rabbit Board since 1942 and was a member of the South Island Rabbit Boards Association for several years before becoming its president. He became chairman of the Rabbit Destruction Council when it was set up in 1948. His tenacity in prosecuting the council's policy and the undoubted success of its application have won him the admiration and respect not only of those in agreement with him but also of many earlier opponents. Remarkable increases in production have been achieved on areas formerly infested with rabbits and improvement in soil cover has been spectacular.

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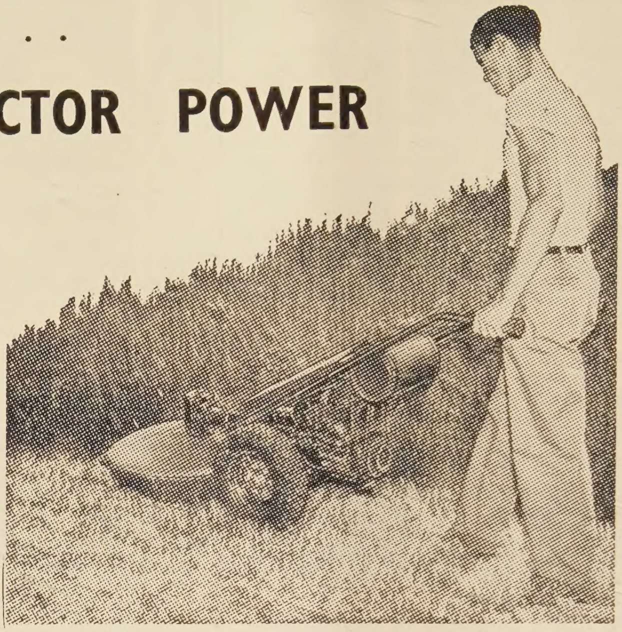

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GRASSLAND CONFERENCE AT GISBORNE

The need for an economic compromise between pastoral use of land of deep-seated instability under high rainfall and the control of erosion was stressed in conference papers and field day discussions. Left to right below—H. E. Gibbs discusses the serious erosion problem on soils developed from high swelling clays and shatter belts; H. de O. Chamberlain shows a sample of the highly erodible Waerengaokuri soils; D. A. Campbell (upper) describes conservation measures at Waerengaokuri through which solutions to the district's erosion problems are being sought; A. D. Todd (lower): "Prospects of successful continuation of grassland farming are by no means hopeless; already the picture is taking shape of a predominantly grassed landscape with streams and slopes filled by artifice and exotic tree species to endure the new conditions imposed by supplanting forest with grass."

ing farms, by subdivision where they are too large, by irrigation in the drier areas of the South Island, and by pasture improvement on North Island hill country and the southern tussock grasslands.

Direction of Expansion

"What should this increased production be? Though we are favoured by climate, we are not favoured by topography or soils. Over 80 per cent of New Zealand is hilly to steep and the soils are of low natural fertility. Until we are prepared to terrace these hillsides, as in Java, they are suited only for pastoral production.

"There are minor modifications we can make, the most important of which is an increase in the area of wheat. However, this is of little application in much of the North Island, as wheat is unsuited to moist heat.

"We could develop a sugar beet industry, but overseas experience suggests it would have a low productivity rating comparable with some of our less efficient secondary industries.

"There may be some possibilities in growing fruit and vegetables for freezing and canning and in the growing of plants for essential oils.

"However, we must return in the main to our three principal products, dairy products, meat, and wool, each of which has given some cause for alarm in the last few years, but the long-term outlook should be relatively good."

After reviewing the prospects for marketing increased output of dairy produce, meat, and wool, Mr Iversen said, "I believe we can have confidence in expanding our production provided that wise political decisions are made to provide a suitable economic climate for development and provided that the farmer is well served in two important ways, in education and in research."

The present education system was not providing farming with enough trained people and national expenditure on research was inadequate, said Mr Iversen.

"While I agree that as agricultural research benefits the whole country, the whole country should pay for it, nevertheless there is a case for farmers taking more interest in a practical way in the provision of funds for research projects; but let me add, not as many farmers would like it done, where they have a hand in the direction of the scientist. The calibre of the men working under such direction will not be the calibre you are seeking."

Mr Iversen concluded that the evidence gave a clear and unqualified "No" to any suggestion that the Association's activities should be changed to an objective other than the improvement of grasslands.

The Paling Fence was Cheap and Efficient

By R. W. GOODALL,
Fields Instructor,
Department of Agriculture,
Motueka

A COMMON sight throughout the Nelson Province in the nineteenth and early twentieth centuries was the paling fence. A plentiful supply of durable timber was readily available and these fences were erected on flats and hills alike.

As the early settlers set about clearing their forest-covered holdings some economic means of confining stock was necessary. The first fences were probably all post and rail. When finances permitted wire was obtained and paling fences were erected.

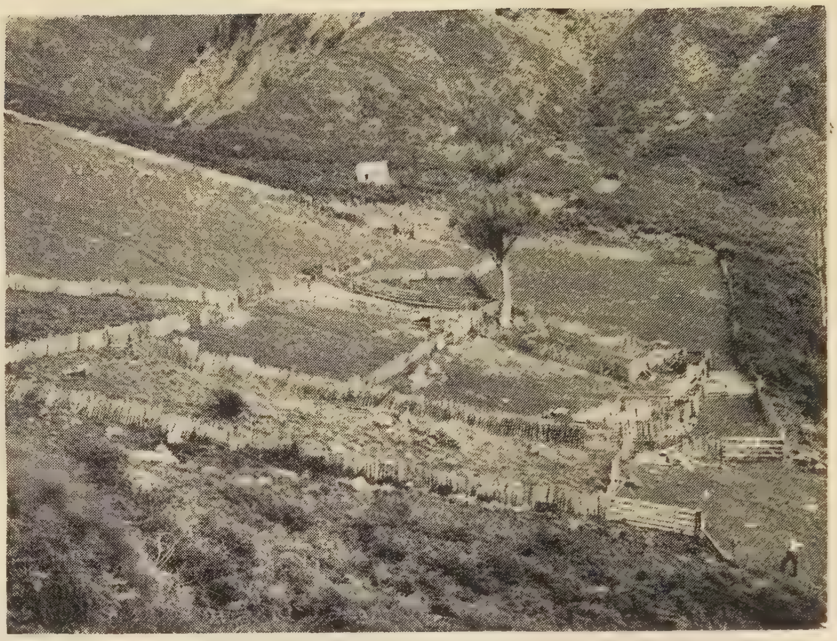
With a plentiful supply of timber available little capital outlay was necessary. The flats became cleared of logs and stumps and more intensive farming methods were practised. Here the paling fences were replaced with post and wire early in the present century.

Hill country was cleared of bush, and good pasture was established among the logs and stumps. Gradually scrub and fern took charge and the fire stick was resorted to. This method of farming, still common today, destroyed the dry wooden fences and only a few remain.

Palings Split from Logs on Site

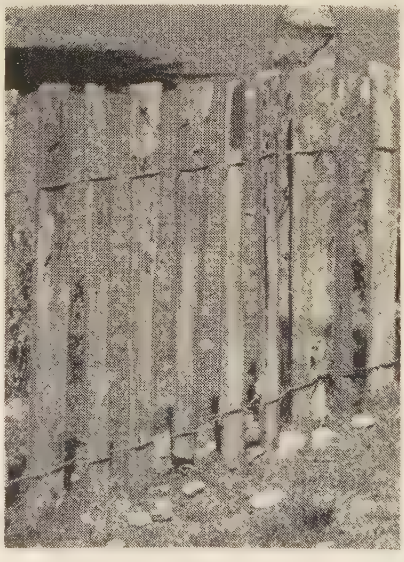
Before the fence was erected logs had to be cleared from the fence line, where much of the fencing material was cut. A straight log would be selected and cut to the required length and split with maul and wedges. Posts were of totara or beech (called birch locally) and the palings were birch, matai, or rimu. The palings were generally split to 3 in. x 1 in. in size and 3 ft 6 in. to 4 ft long.

In the erecting of the fence posts were set in the ground at about 12 ft intervals. Two strands of wire were fastened some 6 in. above ground level and two further strands the same distance below fence height to a strainer post at the end of the fence where erection was to begin. These strands were played out along the line of the fence and fastened to a firm but movable object, usually a post lying on the ground.



Paling fence sheep yards which are believed to be 50 years old.

The reason for this was that as the palings were placed in position so the wires tightened, and if they were fastened to a stationary object at both ends of the fence, they would require continual slackening. The post on the ground held them firm, but as pressure increased it moved over the ground toward the fencer.



The palings are fastened by strands of wire which are twisted round each paling.

Black steel wire was originally used. This was not very flexible; nor would it stretch like present-day galvanised wire. Each pair of wires received a twist before the paling was put in place and to prevent tangles the twist was reversed for each paling. The spacing between palings was 2 to 3 in. and as each panel was completed the wire was stapled or tied to the fence post. A correctly erected fence was tight and palings could not easily be removed.

Long Life of Fence

These fences proved efficient in confining sheep and cattle. Some are still useful after 50 years or more. (The sheep yards in the illustration above are considered to be 50 years old.)

The biggest drawback of these fences was susceptibility to fire. Apart from that maintenance was not great. Odd palings would be broken by stock and the wire would stretch, but it could easily be tightened by insertion of a few extra palings here and there.

Good timber is scarce on these holdings now and steel standards and wire are replacing one of the last links with the pioneers.

The Home Orchard in Autumn

[Sparrow

By D. W. McCALLUM,
Horticultural Instructor,
Department of Agriculture,
Blenheim

FRUIT is highly perishable and the home orchardist should avail himself of varieties which will store for some months, thus enabling him to spread the consumption of fruit over a considerable part of the year. This article discusses storing of fruit and also deals with seasonal work in the home orchard in autumn.

MOST varieties of apples and pears harvested from early March on can be stored satisfactorily. Early varieties such as Gravenstein and Irish Peach are not suitable for storage, as they rapidly lose condition after harvesting. Cox's Orange Pippin and Jonathan are suitable for short storage and Delicious and later maturing varieties store well under suitable conditions. With pears, William's Bon Chretien has a very short life off the tree; mid season varieties such as Packham's Triumph are suitable for short storage and Winter Cole and Winter Nelis store quite well.

Only sound fruit harvested at the correct stage of maturity may be satisfactorily held for any length of time. The optimum time for harvesting fruits was discussed in the February 1959 issue of the "Journal".

Briefly, however, fruit is ready for picking when the colour is reasonably developed and the stalk comes away readily when the fruit is lifted with a slight twist.

Fruit left on the tree until fully mature will not store well. Fruit does not, as a rule, mature evenly over the whole tree and several pickings may be necessary to ensure that all fruit is harvested in the best condition.

Small fruits are less subject to storage breakdowns than large fruits. The best size for apples and pears for storage is about 2½ in. in diameter or less.

Trees should not be thinned too heavily if fruit from them is to be stored. Fruit from a tree with a heavy crop will generally keep better than from a tree with a light crop.

Fruit from trees up to six or seven years old is more likely to break down in storage than fruit from older trees

The container for storing fruit should be clean and, if the fruit is to be stored outside, capable of withstanding moisture. The container should not be too deep; sufficient for six layers of fruit is ample, because fruit at the bottom could be damaged if there was too much pressure on it. Containers should not be filled above the top if they are to be covered or stacked.

Fruits stored inside should each be wrapped. This tends to reduce wilting and helps to isolate any rots.

The normal chemical and physical changes which occur in apples and pears continue after the fruit has been harvested.

The aim in storing fruit is to slow down this chemical and physical activity and so prolong the life of the fruit. Commercial cool stores, where temperatures and humidity can be accurately controlled, ensure that the fruit is stored in the best possible condition.

In the home orchard use has to be made of such facilities as are available. A cool, well ventilated position with as little fluctuation in temperature as possible is desirable. Fruit may be stored outside in a shady position, but should be protected from rain.

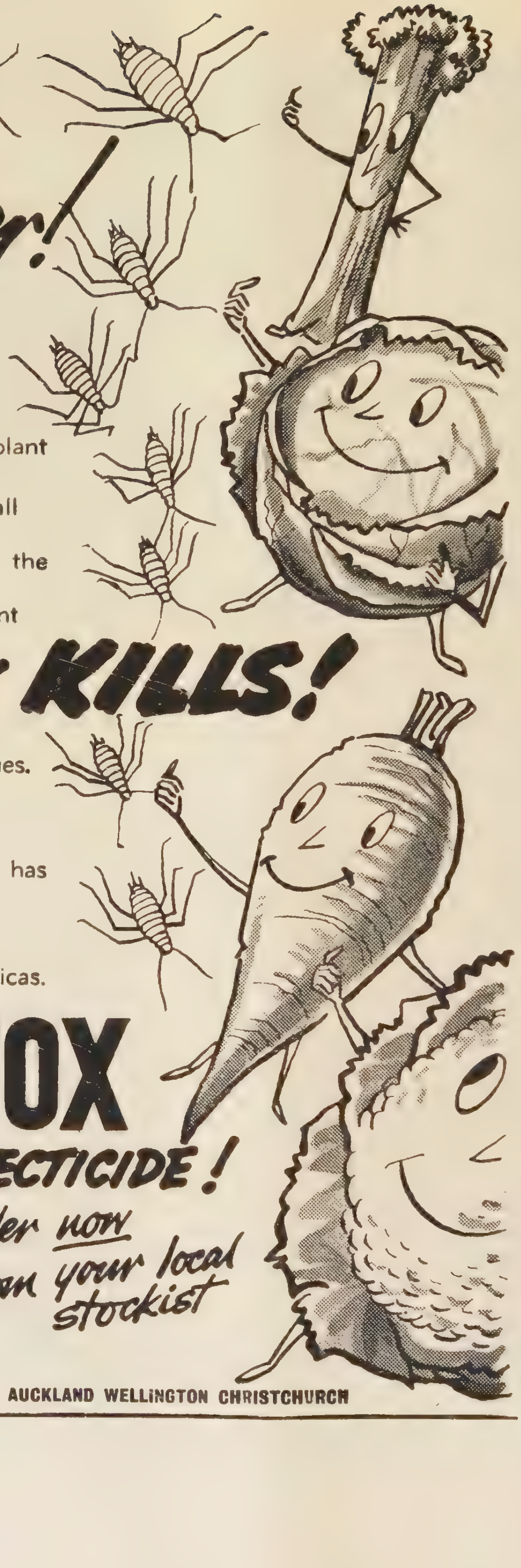
Cases should be protected from rodents and are best stored above ground level as a deterrent to woodlice. The top cases should be covered and 1 in. x 1 in. battens placed between cases to ensure free circulation of air.

Fruit should be examined periodically and any showing rots should be removed. Fruit should be used promptly as it reaches full maturity.

Storage of Other Fruit

Stone fruits and berry fruits have a limited storage life. The household refrigerator can be used to keep small quantities for up to a fortnight if the fruit is in perfect condition when harvested, but once it is removed deterioration is rapid.

Citrus fruit may be handled the same as for apples. Lemons can usually be held off the tree for much longer than other citrus fruits, especially if they are picked green or silver. When held at warm temperatures lemons will soon colour, skin thickness will be reduced, and juice content will increase.



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SEASONAL WORK

Citrus Fruit

Scale insects can have a debilitating effect on citrus trees if allowed to multiply. Most common is the circular black scale which excretes a sticky substance on which grows sooty mould fungus. Summer oil at 1 pint to 4 gallons of water will control these pests. Instructions on the container for mixing the oil must be carefully followed; otherwise the oil will not mix readily with the water.

Stone Fruit

Though there is no urgency to prune stone fruit, it is advisable early in autumn to remove and destroy (preferably by burning) all shoots and fruits which have been affected with brown rot.

Diseased fruits which have dropped and are a potential source of infection for the next season's crop should be gathered up and either buried deeply or burnt.

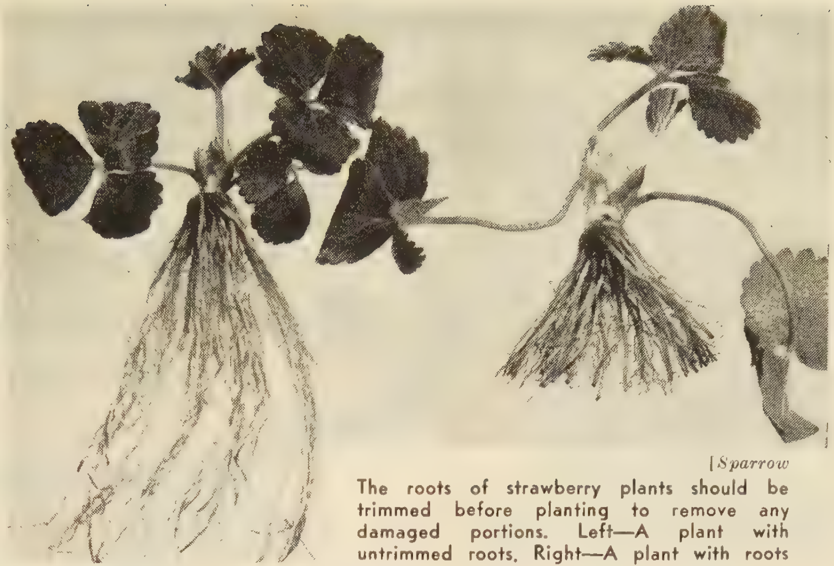
Small Fruit

Raspberries

All raspberry canes which have just cropped should be cut back to ground level and the number of new season's canes reduced by thinning when necessary.

The vigour of the plant and the system of culture will dictate the number of canes to leave. On healthy, strong bushes about a dozen canes may be left when plants are growing on the hill system and about four canes per stool on the hedge system. All prunings should be burnt. If rust has been a problem in the past season, an autumn lime sulphur spray, 1 pint in 4 gallons, will reduce overwintering infection.

Inefficient pruning of raspberry canes. The stubs of old canes are a source of carried-over infection of fungous diseases and harbour insects.



[*Sparrow*

The roots of strawberry plants should be trimmed before planting to remove any damaged portions. Left—A plant with untrimmed roots. Right—A plant with roots trimmed ready for planting.

Strawberries

Early autumn planting of strawberries enables the plants to become established before the soil temperature drops too low for satisfactory root growth; spring growth will be earlier and cropping will almost certainly be heavier and earlier.

Only runners from healthy plants which have carried good crops of fruit should be saved. All the runners from one plant will have similar cropping potentialities, except that the first runners formed will have rather better systems and be larger than those formed later. This difference is purely because of age. Established strawberry beds should be cleaned up and unhealthy or unthrifty plants destroyed.

It is not usually good practice to carry a strawberry bed on for more than two years.

Meteorological Records for December

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	65.2	+ 2.5	79.0	43.5	3.97	15	— 0.12	0.64	25	194
Auckland	160	66.3	+ 2.6	77.2	53.7	4.27	10	+ 1.34	1.44	14	186
Tauranga	12	63.6	+ 1.5	76.0	44.5	2.67	13	— 0.86	0.85	13	205
Ruakura	131	63.8	+ 3.1	77.9	41.2	2.91	13	— 0.17	0.71	30	213
Whakarewarewa ..	1,006	62.0	+ 1.8	80.5	42.6	2.97	11	— 1.19	0.83	14	168
Gisborne	14	63.8	+ 1.1	85.3	39.1	1.75	14	— 0.16	0.42	14	190
New Plymouth ..	160	63.4	+ 3.4	78.6	46.0	2.54	10	— 2.05	0.44	9	170
Karioi	2,125	58.4	+ 3.2	75.1	36.0	2.94	10	— 0.97	0.91	15	
Napier	5	64.2	+ 1.0	87.0	41.8	0.95	9	— 1.03	0.30	15	215
Wanganui	72	63.2	+ 1.8	79.6	42.8	2.30	7	— 0.56	1.16	25	221
Palmerston North ..	110	63.3	+ 2.9	78.0	45.6	1.27	7	— 2.01	0.45	8	188
Waingawa	340	61.2	+ 1.0	79.0	35.8	0.55	8	— 1.96	0.14	9	167
Wellington	415	60.5	+ 1.4	76.3	46.1	1.98	9	— 1.48	0.68	9, 14	205
Nelson airfield ..	5	60.8	+ 1.4	78.1	42.2	1.60	9	— 1.24	0.52	30	238
Blenheim	12	62.5	+ 1.7	80.0	40.5	0.73	6	— 1.27	0.34	9	226
Hokitika	15	60.2	+ 4.1	75.8	43.6	8.08	12	— 1.88	4.50	9	202
Hanmer	1,270	58.6	+ 0.8	83.1	40.4	1.45	8	— 2.26	0.51	9	101
Christchurch ..	22	60.2	+ 0.4	82.1	45.1	1.20	8	— 1.34	0.54	14	124
Ashburton	323	60.0	+ 0.9	90.2	42.6	3.12	13	+ 0.11	1.15	5, 14	106
Timaru	56	59.0	+ 0.3	75.9	41.3	2.66	14	+ 0.00	1.30	9	90
Alexandra	520	63.0	+ 2.8	82.0	39.5	2.18	12	+ 0.88	0.47	13	181
Taieri	80	56.9	+ 0.9	82.4	43.8	4.30	14	+ 1.74	1.52	14	109
Invercargill airfield	0	56.7	+ 1.7	75.6	38.9	3.06	13	— 0.54	0.59	14	140
Chatham Islands ..	150	55.2	+ 0.2	65.1	42.1	1.23	13	— 1.06	0.33	9	

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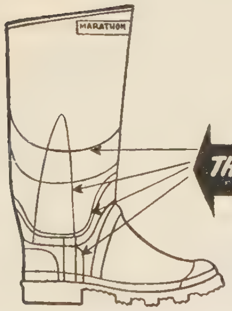
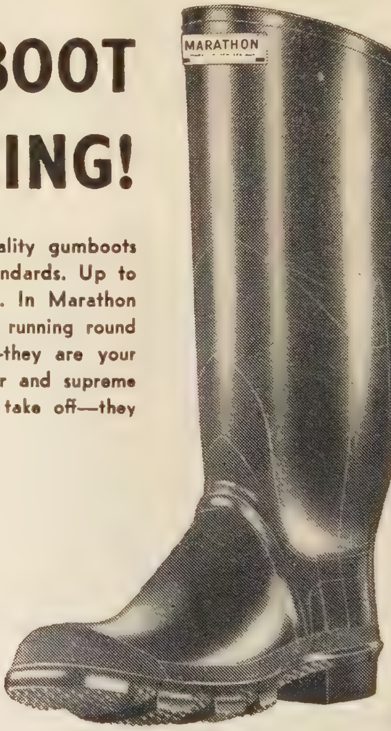


THESE LINES MEAN SOMETHING

On a Marathon Gumboot these lines mean something more than thicker rubber—they mean EXTRA reinforcement built in to strengthen the boot where required.



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A REGRETTABLE TENDENCY by farmers to expect too much—up to 12 months' protection—from the newer insecticides, even when they are applied as dusts or sprays by quick methods, is commented on by the authors of the paper below. Unreasonably expecting such a long period of protection, farmers have neglected to watch for reinfestations and both sheep and fleeces have sometimes suffered unnecessary damage. All four insecticides listed in the trials described—dieldrin, aldrin, diazinon, and ronnel—gave much the same period of protection from reinfestation: about 15 weeks for lice and 20 weeks for keds. The need for a second treatment in most circumstances is indicated.

Control of Lice and Keds

A comparison of dieldrin, aldrin, diazinon, and ronnel

By

R. L. TAYLOR, E. M. OXNAM, and W. K. MARRIS,
Farm Chemicals Company, Mapua, Nelson

CROSSBRED ewes with three months' wool treated with ¼ gram of active chemical were run with untreated sheep carrying lice and keds and inspected weekly on the property of Farm Chemicals Company, Mapua, Nelson, to ascertain the periods of protection against lice and keds afforded by the insecticides dieldrin, aldrin, diazinon, and ronnel.

Experimental

QUARTER gram of active insecticide was prepared as a finely divided stable emulsion in ½ pint of water and sprayed by hand wand on to a sheep. A pressure sprayer feeding through a hollow cone nozzle was used to give a fine spray. A few sheep were done by a small hand duster, using finely divided dust containing ¼ gram of active insecticide. In all cases uniform coverage over the whole sheep was attempted.

It was considered that a better comparison of insecticidal persistence could be made if sheep were treated individually instead of being treated by a powered walk-through spray race or duster. Tests by the authors had shown that when spray races or powered dusters are used the deposit is likely to vary widely from sheep to sheep.

The treated sheep were run with a comparable number carrying heavy infestation of body lice (*Damalinia ovis* syn. *Bovicola ovis*) and keds (*Melophagus ovinus*). To encourage transfer of parasites the sheep were run in ¼ acre paddocks and yarded frequently. Weekly inspections showed that the transfer rate was sufficiently high for the experiment.

To check whether parasites on a test sheep were newly transferred and would be killed, or were able to live as a result of the insecticide becoming inactive, treated sheep were observed after a few days in isolation. The authors acknowledge advice on this technique from Mr P. L. Thomas, late of Wallaceville Animal Research Station.

Sheep no.	Treatment	Date treated	First reinfestation		Period of protection		No. of keds at shearing 15/10/59
			Lice	Keds	Lice	Keds	
143	Dieldrin spray	28/1/59	26/6/59	3/7/59	21 weeks	22 weeks	—
148	Dieldrin spray	21/1/59	3/7/59	20/7/59	23 weeks	26 weeks	50
235	Dieldrin spray	3/2/59	26/5/59	26/6/59	16 weeks	20 weeks	300
236	Dieldrin spray	3/2/59	26/5/59	14/7/59	16 weeks	23 weeks	--
240	Dieldrin spray	3/2/59	19/6/59	19/6/59	19 weeks	19 weeks	50
243	Dieldrin spray	3/2/59	—	20/7/59	—	24 weeks	-
149	Aldrin spray	21/1/59	18/5/59	12/6/59	17 weeks	20 weeks	6
150	Aldrin spray	21/1/59	26/5/59	3/7/59	18 weeks	23 weeks	—
241	Aldrin spray	3/2/59	12/6/59	12/6/59	18 weeks	18 weeks	10
242	Aldrin spray	3/2/59	18/5/59	14/7/59	15 weeks	23 weeks	75
245	Aldrin spray	3/2/59	12/6/59	14/7/59	18 weeks	23 weeks	8
247	Aldrin spray	3/2/59	26/5/59	12/6/59	16 weeks	18 weeks	15
102	Aldrin spray	28/3/59	—	30/7/59	—	18 weeks	50
104	Aldrin spray	28/1/59	18/5/59	14/7/59	16 weeks	24 weeks	—
130	Diazinon dust	5/2/59	18/5/59	14/7/59	15 weeks	23 weeks	10
140	Diazinon spray	28/1/59	—	14/7/59	—	24 weeks	20
141	Diazinon spray	28/1/59	18/5/59	26/6/59	16 weeks	21 weeks	—
244	Diazinon spray	3/2/59	—	12/6/59	—	18 weeks	25
246	Diazinon spray	3/2/59	18/5/59	26/6/59	15 weeks	20 weeks	—
249	Diazinon spray	3/2/59	—	14/7/59	—	23 weeks	—
250	Diazinon spray	3/2/59	18/5/59	12/6/59	15 weeks	18 weeks	25
132	Ronnel dust	5/2/59	26/5/59	14/7/59	16 weeks	23 weeks	200
135	Ronnel dust	5/2/59	18/5/59	3/7/59	15 weeks	21 weeks	—
139	Ronnel spray	28/1/59	—	12/6/59	—	19 weeks	—
237	Ronnel spray	3/2/59	18/5/59	14/7/59	15 weeks	23 weeks	20
238	Ronnel spray	3/2/59	26/5/59	14/7/59	15 weeks	23 weeks	18
239	Ronnel spray	3/2/59	18/5/59	14/7/59	15 weeks	23 weeks	150
248	Ronnel spray	3/2/59	18/5/59	12/6/59	15 weeks	18 weeks	20

Longer protection against lice by dieldrin or aldrin in comparison with diazinon or ronnel is barely significant. Other differences among the insecticides are not significant.

Test sheep were observed for some weeks after they became reinfested to make sure that they were favourable hosts. Unless sheep proved to be favourable hosts their freedom from parasites earlier could not be ascribed with certainty to the insecticide. It is important to bear this in mind, especially for lice, which may disappear from sheep which have not been treated with insecticide.

Lice failed to establish properly on six sheep, accounting for the blank spaces in the table on page 115. Keds were counted at shearing and recorded in round numbers. Blank spaces in this column are due to some sheep being treated for another trial.

Discussion

It is recommended that sheep with three months' wool should be sprayed for control of lice or keds with insecticide of 0.20 per cent concentration when using a non-return spray race passing 4 gallons per minute. If 40 sheep are sprayed per minute, 0.91 gram of insecticide is used per sheep. It is also recommended that sheep should be treated with dust containing 3 per cent insecticide at 12 sheep to the pound for control of lice and keds. In this case 1.13 gram of insecticide are used for each sheep. A great many sheep are now treated in New Zealand with insecticide at rates corresponding approximately to these assumptions.

Though claims have been made for deposition of ½ gram of insecticide per sheep from these treatments, the authors maintain ¼ gram is a more representative figure; ½ gram is too optimistic an estimate. especially for sheep which pass through the race quickly.

A somewhat larger deposit of insecticide is possible from partial-return sprayers putting out 10 gallons per minute, provided the wool is long enough to hold the larger quantity of spray. Some extension of the period of protection conferred by the ¼ gram deposition may be assumed, but it appears likely that the additional protection would amount to a few weeks only. Results available from numerous trials show that when the amount of insecticide applied is doubled the additional period of protection gained is small. Our conclusions are therefore reasonably applicable to partial-return spray races.

The weather during the trial was drier than normal, but included some heavy falls of rain. The wet periods were of short duration. This may have favoured both diazinon and ronnel to some extent, as they are less stable to water than dieldrin and aldrin.

Conclusions

Low volume spraying and dusting of sheep as commonly practised in New Zealand for control of lice and keds can be expected to keep sheep **free of lice** for about **15 weeks** and free of **keds** for about **20 weeks.** Where a flock is open to re-infestation two treatments should be done each year. The large number of keds at shearing (eight months after treatment in this experiment) indicates that reliance must not be placed on one treatment.

Though trials show that lice have generally been eliminated by one spray or dust treatment, the authors recommend a second treatment two months after the first, if flocks are known to be infested. This will greatly reduce the risk of lice being carried over the winter.

☆

A. and P. Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:

NORTH ISLAND

February

16 February—Otorohanga at Otorohanga.
18 February—Matamata at Matamata.
19 and 20 February—Ohura at Nihoniho.
19 and 20 February—Franklin at Pukekohe.
19 and 20 February—Masterton at Masterton.
20 February—Te Puke at Te Puke.
24 February—Morrinsville at Morrinsville.
26 and 27 February—Te Kuiti and District at Te Kuiti.
26 and 27 February—Wellington and Hutt Valley at Trentham.
27 February—Mangonui County at Kaitaia.
*27 February—Putaruru District (Jubilee Show) at Putaruru.
27 February—Northern Wairoa at Arapohue.
27 February—Waimarino at Raetihi.
27 February—Whakatane at Whakatane.

March

5 March—Albany at Albany.
5 March—Opotiki at Opotiki.
*5 March—Waiotira Junction at Waiotira.
*12 March—Kumeu District at Kumeu.
*19 March—Wellsford at Wellsford.

SOUTH ISLAND

February

20 February—Maniototo at Ranfurly.
*20 February—Murchison at Murchison.
27 February—Central Otago at Omakau.
27 February—Kaikoura at Kaikoura.
27 February—Buller at Westport.

March

5 March—Amuri at Rotherham.
5 March—Temuka and Geraldine at Winchester.
12 March—Mayfield at Mayfield.
12 March—Cheviot at Cheviot.
12 March—Mt. Benger at Roxburgh.
15 March—Lake County at Arrowtown.
19 March—Upper Clutha at Wanaka.
19 March—Methven at Methven.
19 March—Hawarden at Hawarden.

April

*2 April—Oxford at Oxford.
9 April—Malvern at Sheffield.
18 April—Strath Taieri at Middlemarch
*18 April—Mackenzie County at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

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IMMEDIATE completion and posting of your Farm Production "Occupier's Schedule" to the Government Statistician will mean considerable saving in the cost of collection and increased value of the statistics. Better use can be made of **prompt** information.

Ram and Ewe Fairs

Dates and venues of ram and ewe fairs up to the end of March are:

19 February—Timaru flock at Timaru (fat breeds).
23 February—Otago at Dunedin.
1 March—South Otago at Balclutha.
4 March—Timaru flock at Timaru (wool breeds).

Wool Sales

Dates and venues of wool sales up to the end of May are:

24 and 26 February: Invercargill
2 and 4 March: Dunedin.
9 March: Timaru.
23 March: Wanganui.
28 and 30 March: Auckland.
4 and 6 April: Napier.
11 April: Wellington.
23 April: Christchurch.
28 April: Dunedin.
2 and 4 May: Invercargill.
13 May: Wanganui.
18 May: Napier.
23 and 25 May: Auckland.
30 May: Wellington.

HORTICULTURAL RESEARCH

Chemical Weed Control in Nurseries

By J. S. SAY,
Horticulturist, Department of Agriculture, Auckland

SOME of the newer weedicides have given excellent control of weeds in general nursery stock in trials by the Department of Agriculture at the Avondale Trial Area in the past two years. Some prevented the growth of weeds from seed for up to six months. The results indicate that weed control by chemicals is practicable in nurseries growing trees, shrubs, and herbaceous perennials and that it could become part of normal nursery practice in New Zealand as it is in some overseas countries.

THE materials used in the trials were monuron (2 lb per acre), diuron (2 lb), CIPC (4 lb), and 2,4-DES (5 lb). None are hormones or have any of the undesirable effects of hormone sprays. They act through the roots and, at the low rates used in the trials, had no effect on established plants but killed the germinating weed seeds. They must be applied to a completely weed-free surface which should be left undisturbed by cultivation so that other seeds will not be brought up from below. They are not effective against established perennial weeds such as couch or convolvulus, for which other methods and weedicides are needed.

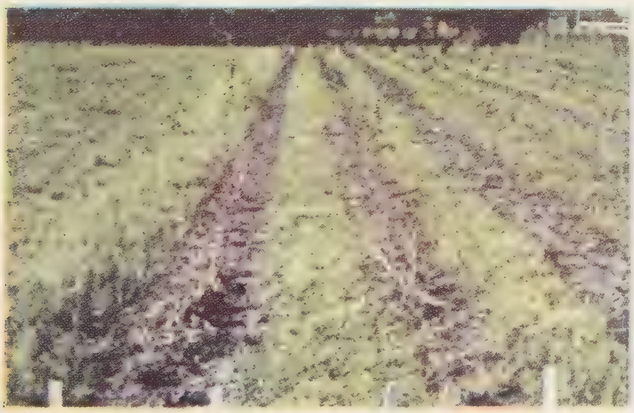
For the trials a wide range of nursery stock including some herbaceous perennials was planted out. It consisted mainly of rooted cuttings and seedlings of trees and shrubs and divided clumps of perennials. The weedicides were applied to a 1 ft-wide strip on each side of the rows with a knapsack spray and, though they were directed on to the soil, no attempt was made to avoid the young plants. To observe the effect on summer and winter weeds, applications were made in early summer and late autumn.

The results may be summarised as follows:

1. None of the materials used had any detrimental effect on the plants.

2. Monuron suppressed all summer weeds, including *Portulaca*, for four months and only scattered weeds were present for a further two months. It gave complete control of winter weeds, including *Poa annua*, for up to three months.

3. Diuron gave similar results.



Winter weed control in young nursery stock. Three months after the application of the weedicides the monuron plot (left) is still almost weed free. 2,4-DES (centre) has not given satisfactory control. The CIPC plot (right) is also weed free. (Photographed in July.)

Summer weed → control. A section of the diuron plot three months after application. Good control persisted for another three months.

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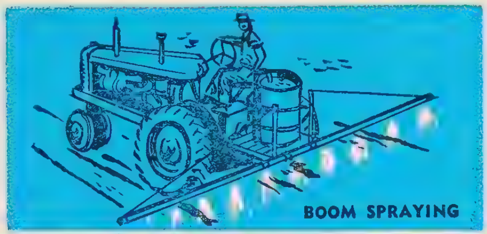
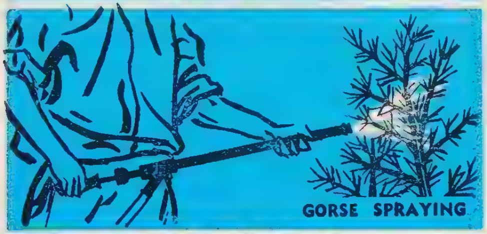
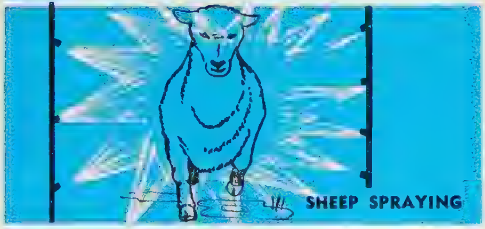
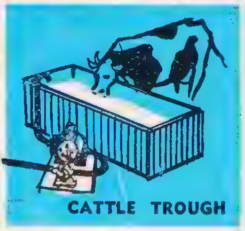






TANK TO FARM HOUSE



FOR WEED SPRAYING

Designed for both high and low pressure use, the models N7500 and N6000 are most suitable for pasture spraying as well as higher pressure spraying of gorse and blackberry etc.

FOR SHEEP SPRAYING

Hypro Pumps are most suitable and economical for the new sheep sprayers. They provide ample pressure and volume for either Tractor or independent engine drive. For livestock spraying they have the pressure to drive the spray material through the hair or wool and thoroughly cover the hide.

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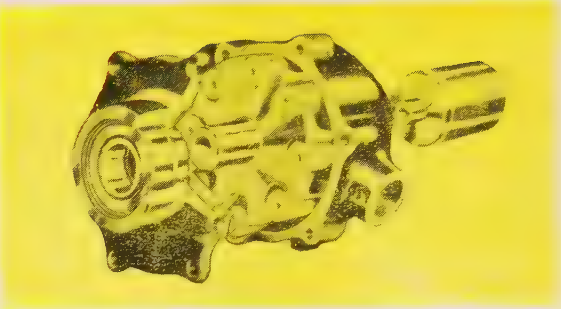
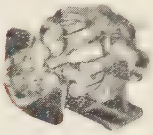


N7500.
High pressure nylon roller pump operates at 350 lbs. P.S.I. either from power take off or independent petrol engine. Little maintenance required.



N6000.
Nylon roller pump operates at pressures up to 200 lbs. P.S.I. High and low pressures for gorse or pasture spraying. Operates from power take off or independent petrol engine.

N1500.
This extremely versatile pump can handle liquids and semi-liquids and is available for countless uses in industry and agriculture.

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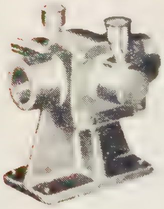

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4 CIPC gave good control of summer weeds for two and a half months and complete control of spurrey. It gave excellent control of winter weeds, including *Poa annua*, for two months.

5 2,4-DES did not give control in the first year, but was fairly satisfactory for six to eight weeks in the second. It was not effective against spurrey or *Poa annua*.

Choice of Materials

Though monuron and diuron were outstanding at Avondale, the other materials may be satisfactory elsewhere, for effectiveness varies according to soil type, temperature, and moisture.

The action of monuron and diuron is quicker where the soil is moist, and they are ineffective until activated by rain or irrigation. They are longer lasting on heavy soils than light soils, from which they leach out fairly quickly, especially in high-rainfall areas.

CIPC is more satisfactory on a moist soil and has a long residual action under cool soil conditions. At high temperatures it volatilises quickly.

2,4-DES should be applied to warm, moist soils; best results are obtained when rain falls immediately after application. It is ineffective on cold soils. In general, 2,4-DES has not been satisfactory in weed control trials in New Zealand, as it is too dependent on correct soil moisture and temperature.

None of the materials is dangerous or unpleasant to use and none has any harmful effect on spray equipment.

Application

As these materials act through the roots and, at low rates, only against germinating seeds, they must be applied to weed-free, newly cultivated ground. It should be well worked up so that it is free of large lumps on the surface and be moist.

The amount of water used to mix them with is not important, as it is only a medium for applying the correct amount of weedicide to a given area. In the trials they were applied with a knapsack spray after the exact amount of water to spray the plots was found by experiment.

Monuron and diuron are wettable powders and should be kept well agitated to prevent settling out. A coarse nozzle should be used. CIPC is an emulsion and mixes readily with water.

Time of Application

For the maximum benefit two or three applications per year would be needed in the average tree and shrub nursery. The first soon after planting out would allow the plants to grow away strongly without competition from weeds; a second application in summer would keep down weeds about stocks intended for budding; and a third could be made in late autumn where winter weeds are a hindrance. The ground would have to be cultivated before each application to get it into a suitable state.

It is unlikely that there would be a build up of any of these materials in the soil, even if applications were made regularly. By thorough cultivation in the intervals between crops and by alternating materials (monuron in summer, CIPC in winter) the possible danger could be further reduced, but it would be unwise to use these materials on an area likely to be used for seedbeds soon after application.

As only one cultivation may be needed every three months when chemical control is used, it appears that a considerable saving in time and labour would result, even taking into consideration that the cultivation would have to be more thorough than normal to get a completely weed-free surface to begin with. The actual spraying time is only a fraction of that needed to cultivate round small plants. The untreated strips between the rows would have to be cultivated occasionally, but this is straightforward work and takes comparatively little time or skill.

Part of the monuron plot photographed in May, six months after application. The inter-row strips were cultivated in February and March.

Where these materials are to be used the area to be sprayed should be calculated exactly and the chemicals weighed out very accurately.

☆

Potassium Deficiency in Grasses

ANALYSES of grasses and clovers separated out from mixed herbage samples from pasture potash trials on Horotiu sandy loam suggested that while the clovers were deficient in potassium, the associated grasses were short of nitrogen rather than potassium. A rates of potassium trial was laid down in 1957 to determine the plant and soil potassium needs of perennial ryegrass, cocksfoot, and paspalum. To avoid the complication of differences in nitrogen fixation by clovers resulting from the different potash rates, pure stands were grown and artificial nitrogen was supplied. The plots had been used previously for rates of potash trials with three annual crops. When the grass trial was laid down the control plots were very low in available potassium, with soil quick-test values below 2.

Relative yields over the period from sowing on 25/9/57 to the last cut on 8/9/59 were as follows:

	Perennial ryegrass	Cocksfoot	Paspalum
Control ..	100	100	100
1 cwt KCl ..	110	137	107
2 cwt KCl ..	115	144	118
4 cwt KCl ..	124	163	120

The ryegrass responses were reduced by nitrogen deficiency in some cuts and by rust attack in summer.

Growth at 9 to 12 in. was cut by the sickle-bar mower at a leafy stage and completely removed from the plots. The cutting proved too drastic for the ryegrass, which had to be resown last autumn. The cocksfoot survived the cutting better, especially on the potash-treated plots, and the paspalum appeared to be unaffected. Both the cocksfoot and ryegrass showed serious nitrogen deficiency, despite the use of a total of 8 cwt of sulphate of ammonia per acre in the 1957-58 season and 11 cwt of ammonium nitrate-lime mixture in the 1958-59 season, and it appears that still heavier dressings of nitrogen will be required for maximum production of these two grasses under the system used in the experiment. In contrast, paspalum always appeared to have lower needs for nitrogen, and though its growing season was restricted to summer and autumn, its total dry matter production was slightly higher than that of the other two grasses.

Only when nitrogen deficiency was corrected were good potassium responses obtained. The maximum potassium responses in yield of ryegrass and cocksfoot were greater than in paspalum.

—*K. J. McNAUGHT*,
Principal Scientific Officer,
Department of Agriculture
Rukuhia Soil Research Station

Recent Research Work

HEADING PHOTOGRAPH: Redroot and willow weed effectively controlled with MCA (left). The section on the right was unsprayed.

WEED CONTROL IN BRASSICA CROPS

NEW chemicals from overseas are continually being tested at Department of Agriculture research stations to determine their likely usefulness in dealing with weeds in this country. Many of the experiments give results which have no practical application, but sometimes new materials are sufficiently promising to warrant extensive trials under different conditions by advisory officers throughout New Zealand. If a treatment proves satisfactory in these trials, it may then be recommended for use by farmers. The use of the sodium salt of monochloracetate for control of weeds in brassica crops is an example of a treatment which has recently given good results in the trials and is now recommended.

EARLIER TRIALS

EXPERIMENTS over a number of years up to 1957 showed that the best treatment for weed control in brassica crops was a pre-emergence application of TCA or CIPC. In addition to the disadvantage that this treatment had to be applied before the weeds and the crop were up, it was not entirely satisfactory. TCA gave poor results if the soil was very dry or if there was sufficient rain to leach the TCA out of the surface layers of the soil. CIPC was likely to cause crop damage if temperatures were high. This factor has limited the use of CIPC except in the Otago-Southland areas.

EXPERIMENTS WITH MONOCHLORACETATE

Initial trials with monochloracetate (MCA) showed that it controlled some of the common weeds in brassica crops. There was little damage to the crops except when high rates of MCA were used or the material was applied when the crops were very small. Further trials were conducted to determine the minimum quantities required to control the weeds and the maximum rates tolerated by different crops at various stages of growth. The crops were harvested and the yield weights compared with those obtained from hand-weeded plots.

The following indicates the degree of weed control obtained with 10 lb per acre of MCA:

Willow weed or redshank (*Polygonum persicaria*): Very good to excellent control of plants up to 4 in. high. With plants 4 in. to 8 in. high, control was variable but usually very good.

Redroot or Prince of Wales feathers (*Amaranthus retroflexus*): Generally similar to willow weed, but control not quite so good.

Spurrey (*Spergula arvensis*): Plants up to 6 in. were controlled at Hamilton, but in some South Island trials much smaller plants were not killed by 15 lb to 25 lb.

Nightshade (*Solanum nigrum*): Small plants up to 2 in. were generally killed, but thick infestations or plants up to 6 in. high were not satisfactorily controlled by 15 lb or 20 lb.

Fathen (*Chenopodium album*) **and grassy weeds:** These were particularly resistant to MCA.

Except for the resistant species, satisfactory weed control was generally obtained with 10 lb per acre of MCA, but 15 lb was better.

RECOMMENDATIONS

In many districts willow weed and redroot are the most troublesome weeds in brassica crops, and MCA is recommended for the control of them. Rape, chou moellier, and swedes should be sprayed with 15 lb per acre of MCA as soon as the crops have four true leaves. The treatment burns the leaves of the crops, but the plants recover and the final yields are not affected. If the crops are more advanced and have five or six leaves, they will tolerate 20 lb and possibly 30 lb per acre of MCA, but such high rates should not be necessary.

Soft turnips are more subject to damage by MCA, and should not be sprayed until they have six true leaves. Well grown crops at this stage usually cover most of the ground and many of the weeds may be protected from the spray. It is probably better to wait and see whether the soft turnips smother the weeds; if so, spraying is not necessary. If the weeds tend to smother the crop, they should be sprayed as soon as they are higher than the soft turnips.

MCA is not volatile. It is water soluble and should be applied in 20 to 30 gallons of water per acre. Spraying should not be carried out immediately before heavy rain.

Spraying brassica crops with MCA gives very good results where the main weeds are willow weed and redroot. If fathen is present or grassy weeds are prevalent, these may dominate the brassica crop after the spraying with MCA through the removal of competition from other weeds. The final result on the crop may be worse than if no MCA were applied. Therefore it is better not to use MCA if these resistant weeds are present.

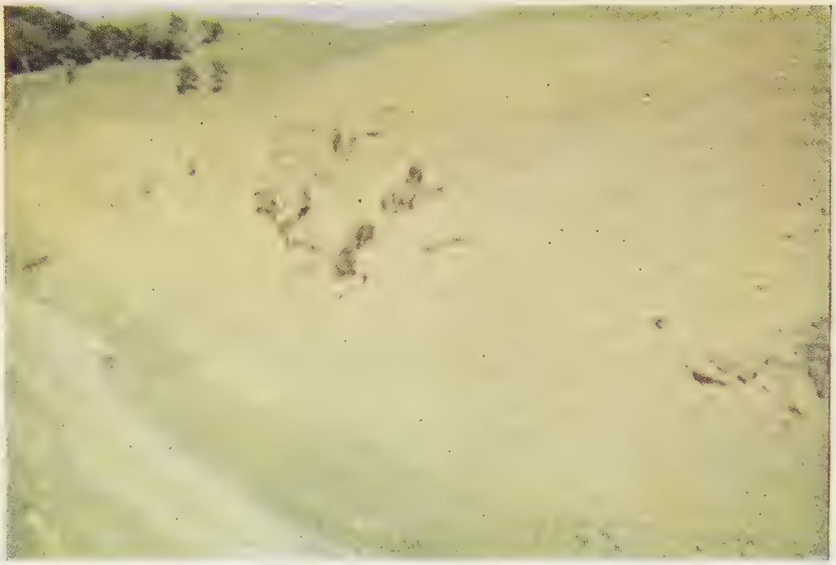
MCA is available under the trade names "Monoxone", "Stantox MCA", and "Winstone's MCA".

—*F. B. THOMPSON, Rukuhia Soil Research Station*

Chemical Pasture Establishment on Steep Hill Country

By L. W. BLACKMORE,
Farm Advisory Officer,
Department of Agriculture,
Dannevirke

THE establishment of new pasture on a 6-acre block of steep hill country by chemical treatment to kill existing turf and sowing and fertilising of the area, all done by aircraft, are described in this article. The trial (with which R. G. Warren, Farm Advisory Officer, also of the Department's Dannevirke staff assisted) was prompted by promising results obtained in small trials in Southern Hawke's Bay in 1956 in which dalapon and TCA were used for presowing destruction of the turf cover.



Three weeks after being sprayed with dalapon and amitrol by a Tiger Moth the hillside had a scorched appearance.

Site of Trial

THE trial was conducted at the Balfour Estate, Pahiatua, where the average annual rainfall is about 54 in. The soil is classified by the Soil Bureau as a Matamau silt loam, which is known to be molybdenum responsive. The trial area consisted mainly of a north-easterly slope too steep to cultivate by conventional means.

The pasture was browntop (*Agrostis tenuis*) dominant with some dogstail and a sprinkling of perennial ryegrass and white clover in the more fertile hollows. Other species present were suckling clover, flat weeds, moss, and Scotch thistle.

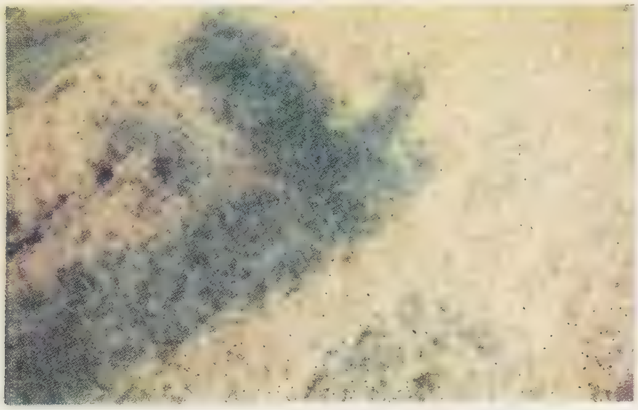
A soil test revealed that the soil was very sour (pH 5.2 and calcium 4) and low in phosphate (phosphate 2). The carrying capacity was about two ewes per acre done moderately well.

Spraying Technique

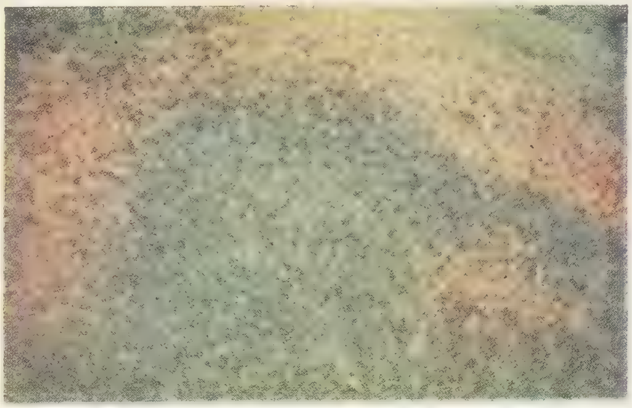
At the time of spraying the sward was close grazed, the pasture being on the average about ½ in. high, though growth in the hollows was a little longer.

The trial area was sprayed on 20 March 1958 by a Tiger Moth aircraft with 5 lb of dalapon and 2 lb of amitrol (50 per cent amino-triazole) in 20 gallons of water per acre. To ensure good spray coverage white marker poles were placed across the line of flight at both ends of the trial at 40 ft spacings, as this was considered to be the effective swath width.

To make sure that spray coverage was even the aeroplane flew over the entire area three times, the three flights being made in the same direction because of the lay of the land. There was a light breeze from the south-west during the first half of the operation, but it was practically calm



One of the depressions in which ryegrass survived the spray treatment and grew quite strongly.



The original sward consisted mainly of browntop with a little ryegrass and white clover confined to the damper hollows. The pasture had been topdressed before the trial but not oversown.

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Before him lie his fertile fields. Serene and ever-changing, they spread to the afternoon sunshine while the white-fleeced sheep and stolid cattle weave slow rhythm-patterns as they graze. There are abiding satisfactions in this man's life; above all there is continuity. For in no other sphere of human endeavour does the end follow the effort so certainly as for the man on the land.

Yet for all its seeming tranquillity, this is a battlefield. Here are poised many microscopic enemies, ready to strike with deadly effect wherever lack of foresight presents a vulnerable target. At such times the farmer looks to veterinary science for assistance, for the laboratories of New Zealand have discovered or perfected preventive vaccines effective against nearly all the farm animal diseases.

T.V.L. is proud of the part it has played in safeguarding New Zealand's bright heritage of "Animal Health" during the past ten years through the provision of vaccines against infectious diseases of livestock.

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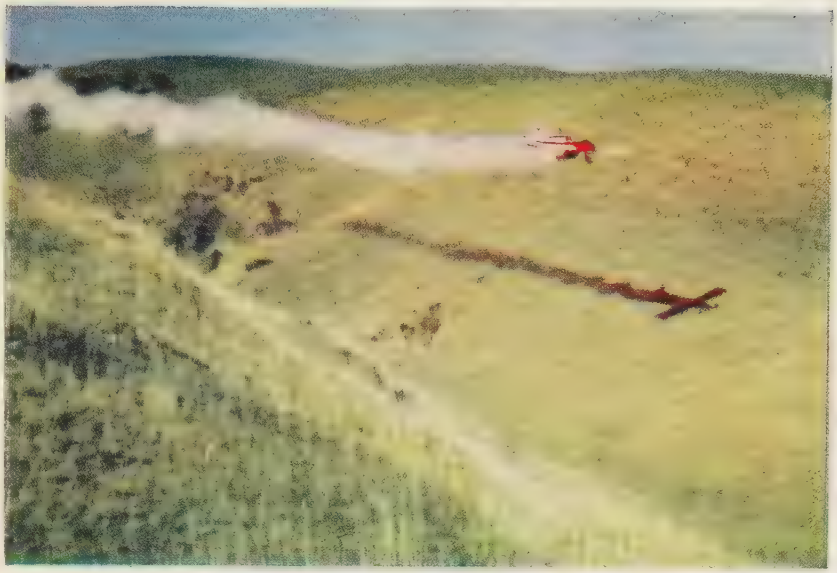
for the remainder of the time. Flying was done late in the day.

As there was a chou moellier and swede crop over the fence along the ridge, the pilot kept the swath edge about ¾ chain in from the fenceline. No visible spray damage showed up on the crop and under the prevailing conditions (any air movement would have been from the direction of the crop) spraying could have been done closer. The pilot accomplished a good even "edge" at the entry end of the trial area, but found difficulty in shaking off the spray at the finish of each run, because the spray tended to follow the aircraft for a time after the flow had been cut off. The spray edge in the direction of flight alongside the fenceline was very even.



Fletcher aircraft applying molybdenised superphosphate (3 cwt per acre) on the same day as the seed was sown.

Weather after Spraying

The weather was overcast at the time of spraying and remained so for four days afterward. During this period no rain fell. There were, however, fairly heavy dews on the night of the spraying and on the following night. On the fifth day 0.12 in. of rain was recorded and a further 0.98 in. on the sixth day. The weather after spraying was excellent and good absorption of the spray by the foliage must have occurred.

Effects of Spray

On 28 March (8 days after spraying) the first signs that the spray was having an effect were noticeable. At this stage there was an overall lightening in colour of the sward. Eleven days after spraying a definite browning of the grasses had occurred, while the flat weeds, Scotch thistle, and moss were all obviously affected. Three weeks after spraying the entire hillside presented a scorched appearance.

Spraying had the following effects on the species present: Most of the browntop was killed outright, but the ryegrass in the hollows survived the treatment and after a temporary setback grew more vigorously than before. The ryegrass stood out clearly in the depressions at this time and gave a mosaic pattern to the hillside. Most of the original white clover, flat weeds, moss, and practically all of the Scotch thistle, which was in the seedling to rosette stages, were killed.

Seed and Fertiliser

It was most important to sow the seed as soon after spraying as this could be done safely because:

1. Undue delay would have given weed seeds and any plants not killed by the spray an opportunity to grow and compete to a greater extent with the sown species.

2. Any delay would have reduced the chances of a successful strike because of the oncoming colder weather.

However, the chemicals used could have affected the strike if the seed had been sown too soon after spraying.

Under the circumstances it was decided to delay sowing to reduce the chances of any residual effects of the chemicals to a minimum. The seed was finally sown on 10 April, 21 days after spraying. From test sowings of clovers made at intervals on the sprayed area it was found that little or no residual effect would have occurred if the seed had been sown as soon as 10 days after spraying. This of course was not known at the time. Ten days after spraying 1 in. of rain had fallen and 2½ in. after 21 days.

Control area: It received the same seed, fertiliser, and lime, but the original sward was not sprayed.

Portion of the chemically established pasture and (in the background across the gully) the unimproved south-westerly face. (January 1957.)

Dense cover of chemically sown area during clover dominant stage.

Reasons for Success of Trial

The results of the trial described in this article were well above expectations. Some important reasons for this were:

The ideal weather following spraying.

The area had a northerly aspect.

The time of establishment was suitable.

The sward was closely and evenly grazed.

Markers were used to guide spraying and sowing.

The pilots were highly skilled.

The Weick venturi distributor was used.

No residual effects of chemicals occurred.

There was no slug, insect, or bird damage of any consequence.

The following seed mixture was sown by air on the chemically treated surface:

	lb
Perennial ryegrass	35
Cocksfoot	5
White clover	4
Montgomery red clover ..	3
Mt. Barker subterranean clover	4
Tallarook subterranean clover	1
Total per acre	52

It was most important to obtain a good strike so that the method could be fully tried out. This heavy sowing rate was used for the following reasons:

- To allow for any deaths in seedlings due to residual effects of the chemicals.
- To allow for any losses due to birds, insects, or slugs eating the seeds or damaging the seedlings.
- To allow for any uneven sowing of the seed by the aircraft.

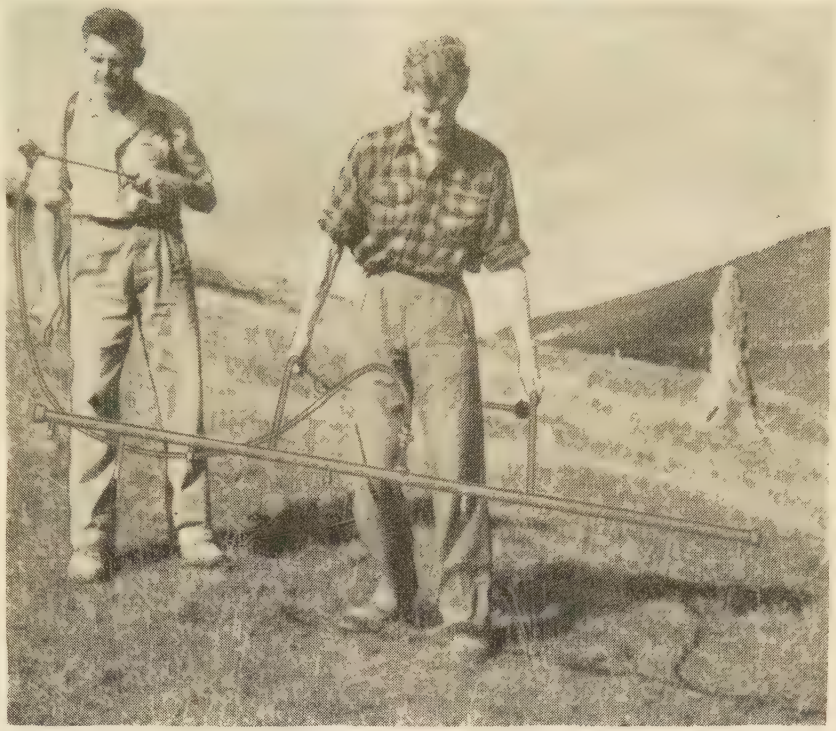
The seed mixture was sown by a Piper Cub aircraft fitted with a multi-venturi tube distributor designed by Professor F. E. Weick, formerly of the Texas Experimental Station, U.S.A., and now on the staff of the Piper Aircraft Corporation. This attachment consists of a combination of six venturi tubes arranged in such a way as to effect wide distribution of the seed. Tests at Dannevirke have shown that under calm conditions a spread of from 45 to 50 ft can be obtained with a full pasture mixture.

To improve the distribution of seed on the trial area sowing was done in two directions and use was made of the markers previously placed for aerial spraying. The weather was calm during the operation and a very even spread of seed resulted.

Molybdenised superphosphate at 3 cwt per acre was distributed by a Fletcher aircraft on the same day as the seed was sown, and because the soil was very sour 12 cwt of lime per acre was applied in May.

A time of spraying and sowing trial on the north-easterly face. Spraying was done with the hand sprayer shown on page 129 at intervals of about a fortnight beginning in March and finishing in early October.

This plot on the south-west face sprayed (20 March) with the hand sprayer and sown (10 April) at the same time as the aerial trial established quite successfully. Sowings made later did not.



This hand spraying unit is operated by a knapsack outfit and was constructed to cope with the small plot work. With a pressure of 25 lb per square inch and with operators walking at 2 miles an hour (1 yard per second) the boom delivers spray at 18½ gallons per acre.

Establishment and Growth

There was an excellent strike of both grasses and clovers. In fact the strike was thicker than was necessary as a result of negligible losses through birds, slugs, insects, and the residual effects of chemicals.

During the first year of the trial the pasture passed through four distinct stages:

1. Slow Initial Establishment

The sown species struck over a much longer period than one would have normally expected on cultivated ground. This was probably because the chemically produced seedbed held a proportion of the sown seed partially suspended at too great a height from the ground to allow a quick strike. Not until collapse of the turf was sufficiently complete did all the seed germinate. However, the final germination was surprisingly complete. There is little doubt that the abundant supply of moisture normally present at this time of year was an important factor in the success of the strike.

Another reason for slow establishment was that the seed was sown on virtually a "starvation" seedbed, as there was no readily available source of nitrogen, owing to lack of clover in the previous sward and also to the demands on available nitrogen of the rotting turf. Though the area looked quite promising by the end of August, the plants had looked very unthrifty during winter.

2. Grass Dominance (Early September to Mid October)

During the first half of September there was a marked improvement in the grass, and its growth from the middle of September to the middle of October was quite spectacular. The rapid growth during this preiod was due to rising temperatures accompanied by a quick breakdown of the turf mat. There is little doubt that the applied lime and molybdenum were important in promoting this breakdown.

3. Balanced Sward (from Mid October to Mid December)

During this period the proportion of clovers in the sward steadily increased, but there was a good balance of clovers to grasses throughout.

4. Clover Dominance (from Mid December to Mid March)

During this period the clovers made prolific growth, finally assuming complete dominance.

Grazing the Area

The area was grazed first on 13 September. Cattle only were used during the first six months. During this time the 6 acres of chemically established pasture and 2½ acres of adjoining unimproved pasture were grazed as one block. From 13 September 1958 to 2 March 1959, 17 yearling Aberdeen Angus cattle were grazed on the 8½ acres.

As the amount of growth produced by the unimproved area was considerably smaller, the equivalent of over two yearlings per acre must have been carried on the chemically established improved area. However, the stock were unable to hold the growth, and on 2 March 250 wethers and 20 cattle of mixed ages were put on the area for three weeks, after which the pasture had become hard grazed.

To allow recovery before winter the area was spelled for six weeks. Recovery was slow, but this was to be expected after the sudden removal of the heavy top growth, and at the end of the spell the growth was between 2 and 3 in. high.

Rate of Stocking

On 6 May 1959, 5½ acres of the chemically established pasture were fenced off from the remainder of the trial and stocked with 35 two-tooth stud ewes and a ram. After six weeks the number was reduced to 34 ewes and these remained on the area until the end of August, when they were moved to easier country for lambing.

Over the winter the ewes had improved considerably in condition and were fat when taken out. On the same day they were replaced by 34 flock ewes in store condition. These ewes lambed in September and were on the area at the time of writing (November 1959). The number of ewes carried was therefore just over six per acre. The original carrying capacity of this country was about two ewes per acre done moderately well.

Effects of Grazing Management on Sward

The trial suffered from the usual difficulties associated with the management of small areas. Grazing at times was too lax and at others too hard. Up to the end of November 1958 pasture control was good, but from then until the beginning of March the stocking rate was too low and the pasture became rank. This led to very prolific clover growth and it was obvious after this growth had been cleaned up in March that a substantial portion of the ryegrass had been lost through smothering. It is considered that fully half the ryegrass was killed out in this way. Cocksfoot withstands

TARTAN *topics*

P.10

TARTAN DIELDRIN SHEEP SPRAY CONCENTRATE

This concentrate solution, containing 25% Dieldrin, has been formulated for use in all non-return or partial return, walk-through spray races. Used at the various rates recommended control of Keds and Lice and protection from Blowfly Strike can be obtained.

MIXING: Add quantities stated direct to water container, stir thoroughly.

DOSAGES: Three alternatives as follows:

1. Control of KEDS and LICE within three months of shearing use:
   - (a) UNIT CAN PACK: 1 can to 40 gallons of water.
   - (b) 1 GALLON PACK: 25½ fluid ounces to 40 gallons or 1 gallon to 250 gallons. This gives 0.1% Dieldrin in the spray.
2. Control of KEDS and LICE and protection against BLOWFLY STRIKE within three months of shearing use:
   - (a) UNIT CAN PACK: 2 cans to 40 gallons of water.
   - (b) 1 GALLON PACK: 51 fluid ounces to 40 gallons or 1 gallon to 125 gallons. This gives 0.2% Dieldrin in the spray.
3. Control of KEDS and LICE and protection against BLOWFLY STRIKE LATER than three months of shearing OR where BLOWFLY STRIKE is severe, use:
   - (a) UNIT CAN PACK: 3 cans to 40 gallons of water.
   - (b) 1 GALLON PACK: 77 fluid ounces to 40 gallons or 1 gallon to 83 gallons. This gives 0.3% Dieldrin in the spray.

TOPPING UP: Keep adding the concentrate at rates recommended as water is used. No further replenishment is necessary.

GENERAL DIRECTIONS: Dosage rates given are based on a spray output of 4 gallons per minute. Should delivery rate of a spray race vary substantially from this figure consult Bulletin G.1 for alteration in dosage ratio required.

TOXICITY: Precautions listed on labels should be followed.

PACK: Unit cans, 6 cans per case (case = 153.6 fluid ozs.) 1 gallon tins, 4 tins per case (case = 4 gallons).

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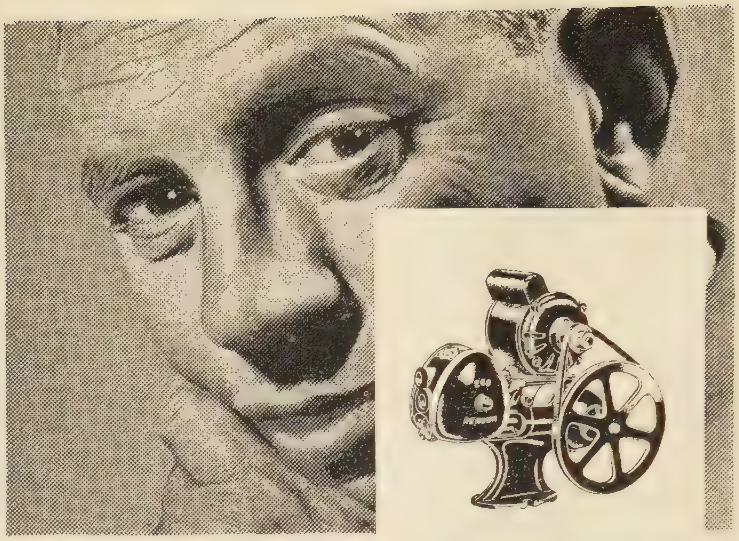

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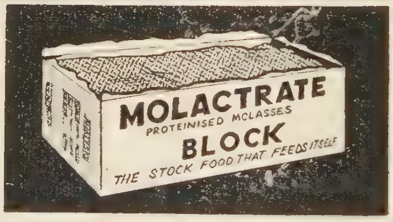

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such treatment very much better and it is considered that very little of it was lost.

Cost of Chemically Produced Seedbed

	£	s.	d.
Chemicals			
5 lb of dalapon at @ 11s. 6d. per lb	2	17	6
2 lb of amitrol @ 18s. per lb	1	16	0
	4	13	6
Spraying			
3 flights over area with fixed-wing aeroplane	3	10	0
Estimated cost per acre of seedbed	8	3	6

The sum of £4 13s. 6d. for chemicals is the actual cost of the materials used. The cost of spraying, however, is only an estimation. The actual cost was a good deal higher than £3 10s., but it will be readily appreciated that an average cost could not be based on so small an area where the runs were short and where the lay of the land necessitated spraying all one way.

On hill country which can be cultivated the cost of producing a seedbed out of grass by contract is unlikely to be much under £8 per acre. This comparison is not made to indicate that chemical pasture establishment is preferable to cultivation on workable country, but merely to show that the costs are comparable.

Time of Spraying and Sowing

One of the main problems on hill country is the difference in climate between sunny and shady faces. Sunny faces are much warmer and drier and this is specially important during late autumn and winter. It is most important to know how these differences influence the results of spraying and the sowing of seed at different times of the year.

From autumn through until late spring sprayings were made fortnightly on both the north-east and south-west faces using a knapsack-operated hand boom spray unit specially designed for these trials. Successful sward kills were obtained throughout this period, except on one occasion when it rained immediately after spraying and continued to do so for four days during which over 2 in. of rain fell. In spite of this an estimated 80 per cent kill was obtained. This must have been due to root absorption by the browntop.

The results from seed sowing at different times were much more variable. A sowing made on the south-west face on 10 April 1958 (the same day as the aerial trial was sown) was successful, but an early May sowing was a complete failure. On the other hand sowings made as late as 19 May on the north-east slope were fairly successful. Spring sowings were in the main only partially successful. This is believed to have been due in part to the dry weather after sowing, but mainly to birds eating the seed.

Conclusions

The outstanding improvement in the pasture and the raising of the carrying capacity from two to six ewes per acre show clearly that under ideal conditions of aspect, climate, and management the method of chemical pasture establishment will work. However, in my opinion, it is too early for the technique to be adopted generally by farmers. Though it is essential for progress that further testing be carried out, I strongly recommend farmers not to spray and resow pastures without first seeking advice from someone with first-hand experience of the method.

Too little is known at present about the practical application and limitations of the chemical ploughing technique for it to pass out of the hands of the research worker. The results of further work and the development of new chemicals and establishment techniques may change our outlook on the whole subject.

Acknowledgment

The assistance of Mr S. Thorne, manager of the Balfour Estate, is acknowledged.

Radio Broadcasts for Farmers during March

RADIO broadcasts for farmers will be given during March as follows:

1XH Hamilton, 12.33 p.m.

14 March—"The International Federation of Agricultural Producers", by R. Woolerton, Federated Farmers, Hamilton.

21 March—"Autumn Activities", by J. R. Murray, Farm Advisory Officer, Department of Agriculture, Hamilton.

28 March—"Care of the Ewe Flock", by L. P. Wells, Livestock Instructor, Department of Agriculture, Hamilton.

2XP New Plymouth, 8 p.m.

10 and 17 March—"New Developments in the Cheese Industry", by F. W. McKeown, Dairy Instructor and Grader, Department of Agriculture, New Plymouth.

17 and 24 March—Radio Vet., by J. H. McDonald, Veterinarian, Department of Agriculture, New Plymouth.

24 and 31 March—"Winter Feeding of Ewes", by R. J. McIntyre, Livestock Instructor, Department of Agriculture, New Plymouth.

31 March—"News and Views from Department of Agriculture's Farm Advisory Division", by S. H. Henry, Farm Advisory Officer, Department of Agriculture, Stratford. "Wool Field Notes", by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui.

2ZA Palmerston North, 12.36 p.m.

1 March—"Husbandry of Dairy Calves and Heifers", by R. Gill, Livestock Instructor, Department of Agriculture, Levin.

15 March—"Autumn Management of Pasture", by J. A. Graham, Instructor in Agriculture, Department of Agriculture, Palmerston North.

29 March—"Irrigation as a Complement to Moisture Control", by R. G. Burton, Farm Machinery Instructor, Department of Agriculture, Palmerston North.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

7 March—"Control of Californian Thistle", by R. H. Smith, Farm Advisory Officer, Department of Agriculture, Invercargill.

14 March—"Meat Inspection", by G. T. J. Martin, Supervising Meat Inspector, Department of Agriculture, Invercargill.

21 March—"Sulphur as a Plant Food", by W. A. Lunn, Fields Instructor, Department of Agriculture, Ranfurly.

28 March—"External Parasites", by Ross Stuart, Livestock Instructor, Department of Agriculture, Ranfurly.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report", followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays, 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer") and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XB Masterton, Fridays at 6.45 p.m. ("Farm Session").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest") and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer"), and 7.10 p.m ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service") and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m. ("News for the Farmer").

◆

Care of Livestock during March

By the Animal Research Division

LENGTH OF LACTATION IS IMPORTANT

IF dairy cows are well fed, they do not need more than 60 days' rest between lactations. Dairy Board statistics show that the average length of lactation in New Zealand is only 248 days. Production could be materially increased by milking cows longer. A good rule is to continue milking a cow while she is giving more than 10 lb of fat per month, unless she is within 60 days of calving.

CULLING OF EMPTY COWS

A cow should never be culled for sterility without being examined for pregnancy by a veterinary surgeon. Many cows thought to be empty have proved to be in calf when slaughtered at the works. The presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent of such cows hold when mated in the following season.

FEED HAY TO CALVES

Calves should have access to good hay at all times. It is particularly valuable after the first autumn rains, and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly growing pasture. Make sure that the calves are rotated through the paddocks at intervals of a few days. Set stocking at this time of the year is bound to result in scouring, unthriftiness, and some deaths.

SLEEPY SICKNESS IN EWES

This disease, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in autumn for grazing by the ewes for three weeks before lambing. Short-rotation ryegrass is particularly valuable for this purpose, as it continues to grow during winter even in Southland.

BLOWFLY STRIKE IN SHEEP

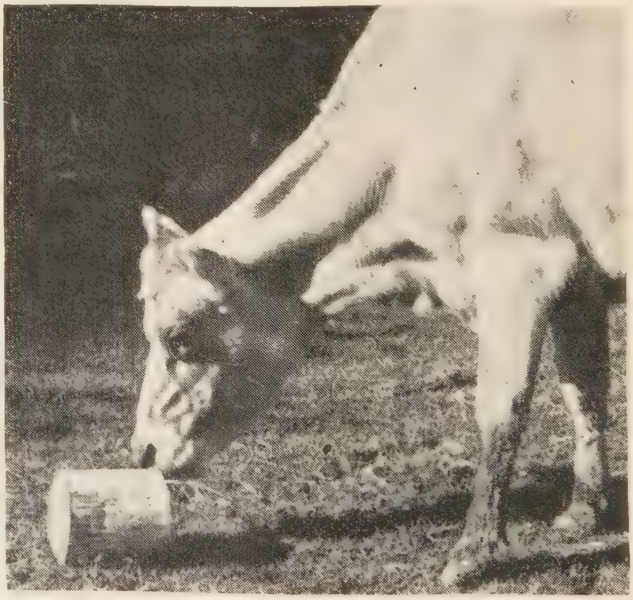
Blowfly strike is likely to occur in showery autumn weather when the humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool so as to leave a clear margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat with a good non-irritant dressing. Jetting with preparations containing DDT, BHC, diazinon, dieldrin, or aldrin will protect against blowfly strike for several weeks.

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under six weeks of age, they can only be prevented by vaccinating the ewes. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping, and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection. Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirit and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over six weeks of age. Where such losses occur it is necessary to vaccinate the lambs themselves.

LEAD POISONING IN CATTLE

Many cattle die from lead poisoning each year. Common sources of lead on the farm are old paint tins, discarded scraps of metallic lead, and old batteries. These should be buried or otherwise disposed of to prevent cattle from having access to them. Calves frequently suffer from lead poisoning through licking painted surfaces, and care should be taken to prevent this.



Establishing and Renovating Pastures

Seasonal Notes by the Farm Advisory Division

PASTURE MIXTURES FOR DAIRY FARMS

FARMERS who are contemplating sowing down a new pasture are advised to discuss an appropriate seeds mixture with their local farm advisory officer. They should tell him how long the paddock is likely to remain down so that he can decide on a mixture suited to a short-term or permanent pasture. Such other points as proneness to summer drought, natural drainage, and whether or not the paddock is suitable for hay or silage making can all influence the amounts and types of the various grass and clover components that will be advised.

Grazing management and after care are almost as important as the mixture itself—they can make or mar a paddock. A permanent pasture mixture for all-round dairying needs which has proved highly satisfactory in South Auckland comprises: perennial ryegrass 23 lb per acre, short-rotation ryegrass 8 lb, cocksfoot 5 lb, white clover 2 lb. A useful addition is 2 lb of cowgrass (broad red clover), where hay or silage is to be made, or 2 lb of Montgomery red clover for a pasture for grazing only.

Certified seed should always be bought. Seed certified in the Permanent Pasture or Standard class (or perhaps the Mother Seed class) is ideal for grazing swards. Purchasers should also see the Seed Testing Station purity and germination certificate covering each variety of grass and clover seed in the mix, which the merchant should have. By so doing farmers can be certain they are buying only clean high-germinating lines.

If a paddock is to be down for one or at most two seasons, the proportion of short-rotation ryegrass may be increased to provide more winter feed. Such mixtures may comprise equal amounts (12 to 15 lb per acre) of perennial and short-rotation ryegrass and 2 lb of white clover. However, this mixture is quite unsuitable in dry summers and for other than high-fertility soils, as the quick growing short-rotation ryegrass may dominate in the early life of the pasture, then weaken over summer, leaving an open sward prone to weed invasion. To fill an overwinter gap between summer crops a straight sowing of 20 lb of Italian ryegrass per acre can be made in March or April. It will produce a quick bite of highly palatable grass with a life of up to nine months. If paspalum is wanted in a permanent pasture, it is best sown in spring with a forage crop such as turnips and the other seed broadcast in autumn after light cultivation to prepare a suitable seedbed.

—*D. M. E. MERRY, Pukekohe*

* * *

RENOVATING SWARDS ON SHEEP FARMS

RUN-OUT pastures on sheep farms are sometimes renovated by overdrilling with grasses and clovers. Disc and sod seeder drills and special "tussock points" fitted to a standard grain drill are used.

On arable land where pasture renewal is designed to fit in with a systematic rotation of cereal and supplementary feed crops, renewal of pastures by ploughing is recommended. Sometimes, however, sheep pastures on arable land could be improved by overdrilling.

Where a number of pastures on a farm have deteriorated through drought or by insect damage it should be possible to bring about some improvement, particularly of younger pastures, by overdrilling. Best results can be expected where the soil is reasonably loose and there is sufficient moisture. Results are not satisfactory where the soil is dry and packed; nor can good results be expected on the dense, weedy turf of an old pasture which has run out to browntop and fescue. The renovation of pastures by overdrilling is also recommended on steep country where there is danger of soil erosion should the pasture be renewed by conventional methods.

Overdrilling is sometimes done on all-grass sheep farms, where little or no cultivation is done, but results can be variable. The method can be quite satisfactory when soil conditions are suitable and there is adequate moisture. Generally, however, best results can be expected from ploughing.

—*W. V. HADFIELD, Christchurch*

* * *

RENOVATION OF WEAK DAIRYING PASTURES

DETERIORATION of dairying pastures is generally due to bad management such as insufficient or incorrect topdressing, overgrazing, cutting for hay too often, or pugging during wet weather.

If the pasture is old or if it has deteriorated badly, ploughing and resowing either straight back to grass or after a crop of white-fleshed turnips for summer feed is best, but heavy fertiliser dressings can often restore them, and more easily and cheaply. The dressing must be one that will really make the clover jump away.

Farmers are sometimes wary of heavy dressings of fertiliser because of the danger of bloat, but whereas a normal dressing of fertiliser might be sufficient only to thicken up the clover without much effect on the grass, a really heavy dressing stimulates the clover so much that it will bring away the high-producing grasses like short-rotation ryegrass, perennial ryegrass, or prairie grass if these are present in the sward. The result is a grass-dominant rather than a clover-dominant pasture. The basis of such a dressing should be phosphate, though the phosphate level of poor pastures is sometimes quite high, in which case normal rates are sufficient.

Generally potash, lime, or molybdenum is required in addition to phosphate for really vigorous clover growth and these should be applied in ample quantities. On potash-responsive soils 2 cwt per acre of potash should be used, while 2½ oz of molybdenum and ½ to 1 ton of lime may be applied also where they are known to be needed.

Phosphate should be applied at 3 to 6 cwt per acre, depending on the present level in the soil. If the application is made in early autumn, the grass will have time to respond to the nitrogen supplied by the clover and by spring the danger from bloat will be small.

If the sward is open because it has been cut up by stock during a wet winter, first roll it; then harrow and overdrill in August with 7 to 10 lb of short-rotation or perennial ryegrass per acre.

Overdrilling can be done successfully in autumn if the pasture can be grazed down short enough, if the soil is moist enough to give the young seedlings a chance to establish and grow, and if fertility is high. Overdrilling can never replace ploughing and resowing on poor-fertility areas where the pasture has run out.

—*A. C. BURGESS, Palmerston North*

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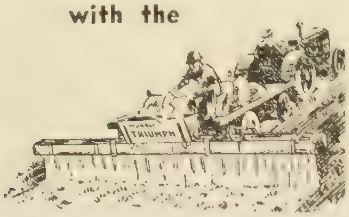

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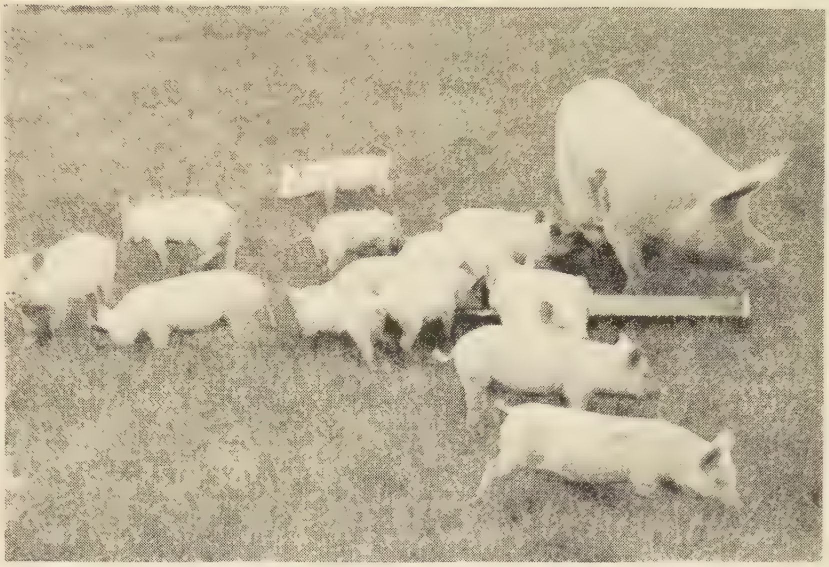
Management of the In-pig Sow is

A Weak Point in Pig Production in N.Z.

ONE of the weakest points in pig production in New Zealand is the management of the in-pig sow. On this largely depends the size and vitality of the litter that is farrowed. In this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, deals with this management and discusses feeding requirements.



Correct management of the in-pig sow will give the result on which successful pig production depends—a large litter of large pigs.

SUCCESSFUL pig production means selling the largest possible number of pigs that can be produced by the breeding stock run on the farm. This depends on the number of pigs farrowed and the number of these successfully reared, a result governed in the first place by the management of the breeding sows during the period they are carrying litters.

At this time of year on the dairy farm the supply of skim milk and whey available for the pigs is beginning to drop as autumn approaches and production from the dairy herd starts to decline. Because there is less food at the piggery, the quantity available to the dry sows is often the first to be cut down.

Importance of Feeding

The successful management of in-pig sows really boils down to the way in which they are fed, and this is the factor that has the greatest effect on the number and quality of the next litter.

A good sow that is milking heavily will always lose condition while she is suckling a litter. Her owner may fail, especially with a large sow, to notice this gradual loss of condition, as he sees the animal every day two or three times. Nevertheless the loss occurs and if a really good litter is to be produced at the next farrowing, this lost condition must be replaced during the first six weeks after weaning and mating.

At this time of year most sows on dairy farms have been recently weaned and mated and anv reduction in the amount of food they are getting is a mistake.

During the first six weeks after weaning, mated sows require on the average about 6 food units per day. This can of course be given as 6 gallons of skim milk when there is plenty of skim milk available. When there is not the quantity should be made up by supplementary foods. This is not an extravagance but a very sound investment.

It is inadvisable at any time to rely on in-pig sows obtaining enough nourishment from pasture to replace lost condition, however good the pasture may be. And at this time of year the pasture available for the pigs is usually far from good.

Supplementary Food

Supplementary food used to make up the sow's ration can be either in the form of meal or of home-grown crops. February is rather early for crops to be available, but there are some that are of use now. In any case the feeding to in-pig sows of at least 1 lb a day of a good meal mixture, such as 1 part of meat meal, 1 part of buttermilk powder, and 8 parts of barley meal, is very sound practice when there is insufficient skim milk to supply them with their requirements to build up lost condition.

Thinnings from fodder beet or sugar beet can be very useful, and carrots, if they were sown in November, could also be used now; in districts where they can be grown early pumpkins would be available toward the end of the month.

Green maize can also be used and is quite valuable if the cobs have reached what is known as the milk stage. Though pigs do not seem to be particularly fond of them, soft turnips, which are still grown in some areas for the cows, can be used.

Green lucerne is a good supplementary feed at this time of year in districts where it can be grown. Pigs, if properly ringed to stop their rooting, can be satisfactorily grazed on green lucerne, as they do not graze low enough to damage the crown of the plant.

A point that must be remembered about all the crops mentioned is that they are bulk foods and that it takes about 10 lb of each of them to equal 1 food unit. They should not therefore be relied on alone to provide enough nourishment for the in-pig sows during the period, and either a gallon or two of milk a day or a pound of meal mixture should be fed as well.

Replacing Lost Condition

A sow carries a litter on the average for 115 days and the most important point in her management during that period is to replace condition lost while she was suckling the last litter. The reason for this is that, as has been shown by research shortly after mating, there are from 18 to 24 live fertilised ova present in the uterus. This number appears to be fairly rapidly reduced and at this stage those that die are reabsorbed.

The main reason for this reduction is insufficient nourishment for the maintenance and building up of the sow and the development of all the fertile ova present. Therefore adequate feeding of the sow at this stage will pay a dividend in the form of a larger litter at farrowing.

Once lost condition has been regained sows should be kept in good level condition for the next five weeks and any tendency to put on too much fat guarded against. The amount of food given can be cut down to about 2 food units a day. At this time of year especially, too much reliance should not be placed on ordinary pasture for this purpose. However, as this stage is generally reached in March and April, any crops that have been grown will be fit to be used.

Final Month before Farrowing

The final month before farrowing is the period during which the weight and size of the unborn litter increase enormously and impose a correspondingly greater drain on the sow's resources. If a large litter of large pigs is to be produced, the sow's rations must be stepped up during this period, not only in quantity but also in quality.

The quantity must be increased to about 6 food units a day and the protein content of the ration must be adequate. This means that at least 1 lb of meat meal a day should be included in the rations.

Increasing the sow's ration during the last month before farrowing has a considerable effect on the birth weight of the pigs in the litter. A heavy birth weight of the individual piglets in the litter is a very important point in achieving really good results. It is a point, too, that is overlooked by pig producers. The birth weight of pigs will vary from 1½ lb to 3½ lb and it is obvious that the pig that weighs 3½ lb at birth has a very considerable start over the pig that weighs only 1½ lb.

The pig has been endowed by nature with the ability to produce a large number of young at one birth, the reason being that, under natural conditions, this comparatively large number is required to keep up the population level. By correct management the farmer can take advantage of this ability on the part of the pig to increase his production of pig meat and in consequence his returns. The first important step is the correct management, which is largely correct feeding, of the in-pig sow, as no more pigs can be finally disposed of as porkers or baconers than are farrowed.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during October 1959 and for the three months ended 31 October 1959 with comparative figures for the same month and for the three months of 1958 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
October 1959	23,698	418	24,116	—
October 1958	25,877	377	26,254	—
Increase or decrease	—2,179	+41	—2,138	—8.143
Three months ended 31/10/59	53,143	868	54,011	—
Three motnhs ended 31/10/58	57,199	751	57,950	—
Increase or decrease	+4,056	—117	—3,939	—6.797

Butter in store at 31 October 1959 was 12,963 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
October 1959	9,564	2,590	12,154	—
October 1958	8,649	2,118	10,767	—
Increase or decrease	+915	+472	+1,387	+12.882
Three months ended 31/10/59	18,222	4,307	22,529	—
Three months ended 31/10/58	15,486	3,483	18 969	—
Increase or decrease	+2,736	+824	+3,560	+18.767

Cheese in store at 31 October 1959 was 6,893 tons

If these figures are converted into butterfat equivalent, there is a decrease of 3.523 per cent in butterfat graded for the three months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

◆

To Head Sheep and Beef Cattle Survey

MR I. M. CAIRNEY, Veterinarian, Department of Agriculture, Dunedin, has been appointed head of the National Sheep and Beef Cattle Survey, which has been established by the New Zealand Wool Board and the New Zealand Meat Producers Board. The survey will collect and analyse data on animal disease, nutrition, breeding, and husbandry.

Mr Cairney.

Mr Cairney gained a B.V.Sc. at Sydney University in 1942. He joined the Department of Agriculture as a Veterinarian in 1945 while still on active service with the Second N.Z.E.F. and after further study in England he graduated M.R.C.V.S. in 1947. He took up his position with the Department at Dunedin the same year.

◆

Sheep Dog Trials

NORTH ISLAND Sheep Dog Trial Association Centre championships will be held as follows:

Northland (Mangonui S.D.T.C.), 12, 13, and 14 May; Waikato (Papakura S.D.T.C.), 12, 13, and 14 April; Main Trunk (Taumarunui C.C.), 25, 26, and 27 February; Taranaki (Waihi-Waitara C.C.), 11, 12, and 13 May; Wanganui (Kawhatau C.C.), 11 and 12 April; Wairarapa and Southern Hawke's Bay (Pahiatua-Makuri S.D.T.C.), 16, 17, and 18 March; Hawke's Bay (Wairoa County C.C.), 20, 21, and 22 April; Poverty Bay (Mahaki S.D.T.C.), 21, 22, and 23 April.

Centre championships in the South Island will be held as follows:

Marlborough-Nelson (Pelorus S.D.T.C.), 25, 26, 27, and 28 May; Canterbury (Mackenzie C.D.C.), 19, 20, 21, and 22 April; North Otago (Waimate), 26, 27, and 28 May; Otago (Tahatika C.C.), 6, 7, and 8 April; Southland (Garston), 28, 29, and 30 April.

The North Island championships will be held at Bay of Islands and will begin on 24 May.

The South Island and New Zealand championships will be held at Blenheim and will begin on 7 June.

◆

Introduction of Queen Bees

BEEKEEPERS are becoming more aware of the need to requeen colonies annually and of the greater returns resulting from the practice. In this article D. W. A. SEAL, Apiary Instructor, Department of Agriculture, Invercargill, describes sound and simple methods by which queen bees can be introduced to colonies with safety by the average beekeeper.

IT is no use attempting to introduce queens to colonies unless they are reasonably strong and have adequate reserves of honey and pollen. Better results are always obtained during a honey flow even if it is only a minor one.

A young queen can lay approximately 1,500 eggs a day and there must be enough worker bees to cope with such a large number of eggs and consequent larvae. Young bees up to three weeks old are the main suppliers of royal jelly, the brood food on which all larvae are fed for the first three days.

Queens can be introduced to colonies in various ways. During a honey flow it is possible to requeen a colony successfully by destroying the old queen and then placing a new queen immediately on to the same comb from which the old queen was removed, or to introduce to a queenless colony a virgin queen that is only a few hours old by putting her in at the entrance to the hive. These methods are not infallible and should only be attempted when the beekeeper is aware that the conditions are favourable for bees to accept a queen by such methods.

More reliable methods must be used when the general conditions are less favourable, especially where valuable queens are used.

Two-queen Method

The two-queen method is popular with beekeepers who prefer to raise their own queens. In spring when honey is available two-storied colonies are split by placing a division board between the two supers.

Care is necessary when making this division to ensure that the queen is in the super below the division board and that there are plenty of young bees in the queenless portion placed above. A side entrance must be provided for the bees in the upper division through an opening in the wooden surround of the division board.

This entrance should be closed with a wad of green grass to prevent the escape of field bees for one or two days. Unless this precaution is taken the field bees on leaving will drift back to their customary entrance at the front of the hive stand and the loss of these bees will weaken the new colony.

On the second day a ripe queen cell is placed with the brood in the upper division and when the new queen has been mated and is laying eggs the division board is removed and replaced with sheets of newspaper. Once the bees have chewed their way through the newspaper the divisions become re-united into a single hive unit.

With this procedure it is not necessary to find either of the queens before uniting the two colonies, as the young queen, being the stronger, will normally destroy the old one, though it is not uncommon for both queens to continue to live and work for some time after uniting.

Use of Cages

The use of a queen cage is a popular method of introducing a new laying queen into a queenless colony. The cage is used to confine the new queen until she has acquired the colony odour and until the bees have recognised the loss of their old queen and are prepared to accept the introduced one.

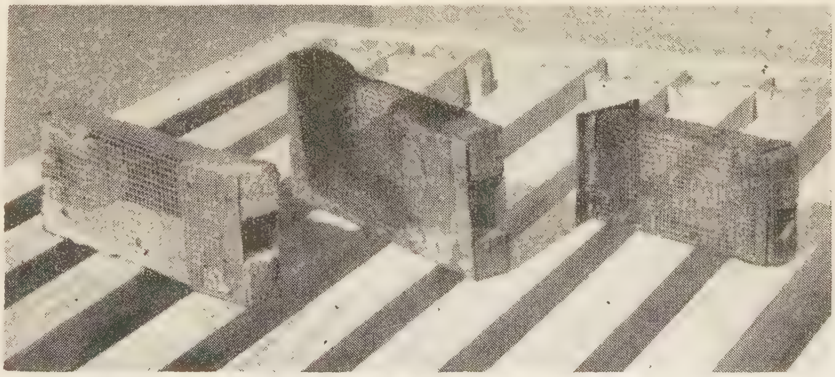
Points which have a bearing on the success of queen introduction are the type of cage used, the method of placing the cage in the hive, the candy used, and the general condition of the colony.

A two-storey colony split by a division board. A side entrance is provided for the top storey of the hive.

Queen Cages

Several types of cages have been devised. A simple one can be made from wire gauze about 6 in. square. A piece about 1 in. square is cut out at each of the four corners and the wire is then folded to form a small wire box.

This type of cage is pressed into a section of comb to enclose a patch of emerging brood, a small area of honey, and some empty cells. With this arrangement the caged queen is able to lay eggs and receive attention from the young bees once they emerged from the brood cells. The queen is confined for three days and is then



Three popular types of Miller cages.

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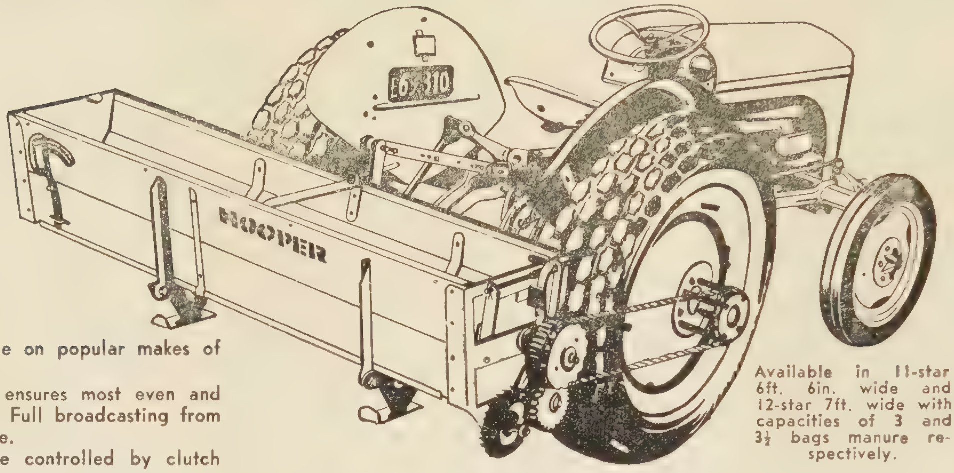
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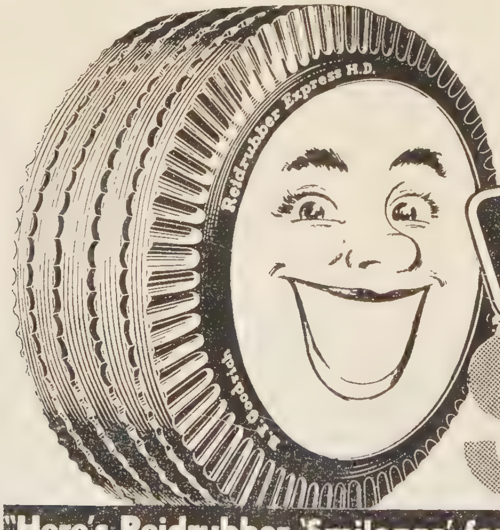
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liberated by removing the cage from the comb.

Doolittle Cage

Various cages from which the queen is liberated by the bees are also used. With these a barrier of candy is placed at one end of the cage through which the bees are obliged to eat a passage to release the queen. The amount of candy is sufficient to enable the queen to acquire the hive odour before release is possible.

The Doolittle cage is the simplest of this type. The cage is made with a cylinder of wire gauze and two pieces of round wood. A plug 1 in. long is cut and fastened into one end of the wire cylinder; the opposite end is closed in the same way with a plug 2½ in. long, but this plug has a ⅜ in. hole which is filled with candy lengthwise through it. The queen makes her exit through this channel, but she is confined until the bees release her by "eating out" the candy.

Miller Cage

The Miller cage is similar in principle to the Doolittle cage, but as it is flat and only ⅜ in. thick, it can be suspended in the brood nest between the combs without interfering with them. This narrowness is attained by constructing the channelled plug with two pieces of tin tacked to two small strips of wood.

A modification of the Miller cage ensures more successful introduction, as the bees can gain access to the queen some time before her own liberation is possible. This cage is constructed with two channelled plugs, one 1½ in. long and the other 2½ in. long, with a section of zinc excluder tacked over the inner end of the shorter plug.

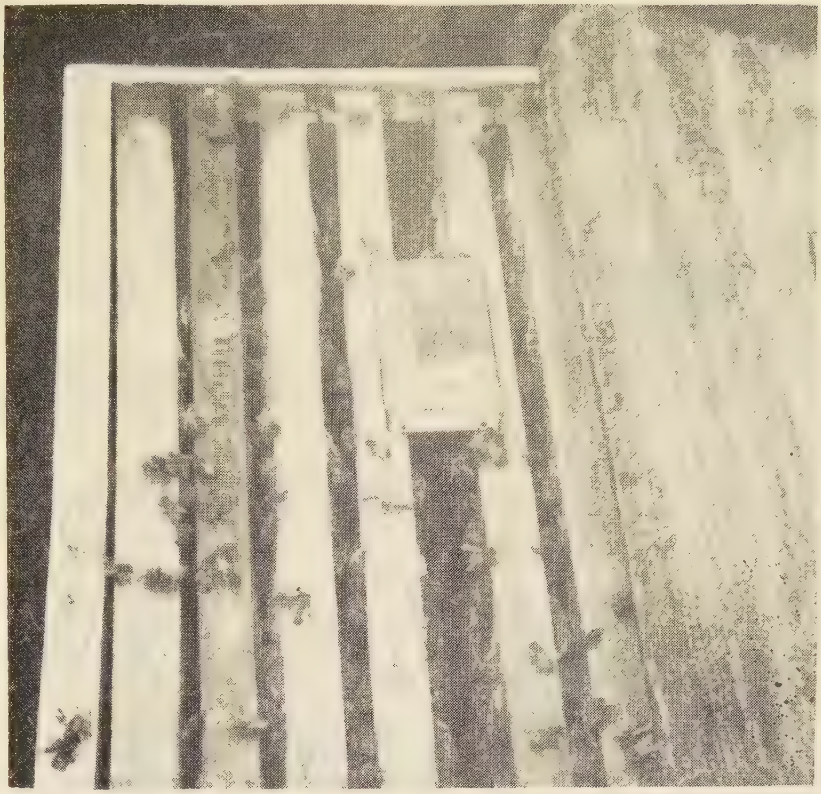
The shorter plug is the first eaten out by the bees. This allows them access through the excluder section to tend the queen pending her liberation through the channel in the longer plug, which is cleared several hours later.

Queen Cage Candy

Queen cage candy is made by kneading icing sugar with honey or invert sugar until it attains a consistency of dough. Though this "dough" should be thick enough not to stick to the fingers, it should not be dry enough to crumble. If the candy is too thick, the bees cannot feed from it; if too thin, it daubs up the bees.

The icing sugar used must be first grade and free from starch. A test for the presence of starch may be made by dissolving a teaspoon of the sugar in a glass of water and adding two or three drops of tincture of iodine. If starch is present, the solution turns blue; if absent, the solution retains the brown tint of iodine.

To minimise the danger of spreading brood diseases some commercial beekeepers use invert sugar instead of honey when making candy. Invert sugar of the right density is obtained by heating a pound of granulated sugar with ½ lb of water to which ⅛ teaspoon of tartaric acid has been added. The syrup is heated to 248 to 250 degrees F.



A Miller-type cage resting on the top bars of the combs, spread to permit a maximum of area for bees to reach the queen.

No-candy Method

During a steady flow of nectar and where the colonies are in good condition it is possible to substitute a small piece of burr comb for candy.

After colonies have been queenless for 24 hours the new queens are placed in their respective cages together with a number of nurse bees. The entrance to each cage is then plugged with a small piece of burr comb, preferably with a little honey adhering. A small hole (about ⅛ in. in diameter or slightly less) is made through the plug to aid the bees to release the queen.

Placing of Cage

Mailing cages are constructed so that only one side is covered with wire gauze. This type of cage is placed on the top bars of the combs with the gauze side facing down into the brood nest. The combs on which the cage is resting should be spread to permit bees easy access to the caged queen.

The hive mat is then folded and placed so that it covers half the cage with the exit end uncovered and free from obstruction. The bees can then work freely, eating out the candy to free their new queen.

Important points when introducing queens in this type of cage are a maximum wire gauze surface exposed to bees and freedom from obstruction at the exit ends of cages. In very hot weather consideration should also be given to ventilation.

Though caged queens can be kept alive for long periods provided bees have adequate access to them through the wire gauze, it is wise to examine each cage three or four days after the introductions to the hives to make sure that all is well. On occasions the candy becomes so hard that the bees are unable to remove it and queens remain confined. If this happens, the candy should be removed and the queen released to join the colony.

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Weed Control in Vegetables

By M. M. BEESON, Horticultural Advisory Officer (Vegetables),
Department of Agriculture, Wellington

IT is axiomatic that the best way of controlling weeds in vegetables is to grow a good vegetable crop, but economics must be considered, and whereas traditional methods depended on the extensive use of hand labour, its high cost in relation to crop returns now precludes its use unless there is no substitute.

CHEMICAL weed control is providing such a substitute, though the close similarity between the vegetable crop and the weeds produces problems which are not encountered in other branches of agriculture. While it is relatively easy to control wild turnip chemically in cereals, this is not so in brassicas. However, as some weeds inexplicably show a high degree of resistance to a herbicide, it is not unreasonable to think that in time materials will be found which are selective between a vegetable crop and the weeds among it.

At present most herbicides which can be used with any safety on vegetables depend on timing in relation to growth of crop and weeds for their effectiveness.

Perennial weeds are rarely prevalent on land intensively cultivated other than in semi-permanent crops such as asparagus, and the worst difficulties in weed control occur in crops which are direct sown and relatively slow germinating, such as onions, and in which annual weeds can become established before the crop appears. The contact pre-emergence method as typified by the use of sulphuric acid in onions has become widely practised, but it has difficulties in the necessity for careful timing and the short-lived effectiveness.

Residual Herbicides

Further development of this technique has been made with residual herbicides which are applied immediately after drilling on the basis that the germination of weeds near the surface of the soil will be prevented but not that of the crop, as the seed is below the depth of soil penetrated by the herbicide. The materials developed so far for this purpose have not been wholly satisfactory because the depth of soil affected is dependent on soil type and rainfall, which can be very variable. Crop damage may thus occur in a wet season when, though these materials are of low solubility, a toxic amount is carried down into the rooting zone of the crop.

Monuron

The 1958 season was the first in which monuron (CMU) was used to any great extent as a residual pre-emergence chemical in the United Kingdom and apparently considerable damage occurred because of the abnormally wet season.

Monuron is, however, used successfully among asparagus plants, which have a higher level of tolerance to it than most other plants, but damage has occurred in crops which have followed an asparagus seedbed on which it had been used. On such contaminated land deep cultivation will distribute the monuron through a greater volume of soil, so diluting it and making it less toxic to sensitive crops.

CIPC

A safer material than monuron as a pre-emergence herbicide is CIPC for application immediately after sowing onions, lettuce, and carrots, but even with this the margin between a safe and damaging rate of application is fairly critical and dependent to some extent on the subsequent temperature and rainfall. Cool weather prolongs its persistence in the soil and while a drought immediately after sowing will result in a too shallow depth of soil being toxic to seedling growth, heavy rain may wash it down into the region of the germinating crop.

At the rate which seems to be the best compromise between killing the weeds and preserving the crop, that is, 4 lb per acre, equivalent to 1 gallon of the emulsion, it is not very effective against fathen and thistle. It is used quite successfully as a pre-planting application to lettuce crops, though on most soils the desirability of breaking the surface crust for aeration reduces the effectiveness of the CIPC. It should be applied as a coarse spray at not less than 100 gallons per acre.

Simazine

A new development in pre-emergence herbicides is the use of simazine in sweet corn. Simazine appears to be toxic to most plant growth when absorbed by the roots, but sweet corn has the ability to change its chemical structure and make it non toxic. It is not yet widely available in New Zealand, but probably will be shortly.

Dinoseb

Beans

While the main use of the amine salt of dinoseb is as a selective contact herbicide on peas, on dwarf and climbing beans it has little selectivity, but it has a use as a pre-emergence or immediately post-emergence herbicide at 2 to 4 lb per acre. Its acivity as a post-emergence herbicide is increased by high temperatures and the low rate should be used if spraying is done on a warm day, about 70 degrees F, while if the temperature is down to 55 degrees F, the high rate is more suitable. The amine form of dinoseb is specified, as this is more selective than the earlier-produced ammonium salt.

The most economic use of it is to spray only the rows, relying on cultivation to keep the inter-row ground clean. On broad beans it is sufficiently selective for use at a maximum rate of 1½ lb per acre before the plants are about 3 in. high and growth has softened.

Peas

Peas can stand up to 3 lb per acre (the high rate in cool weather) before they are about 10 in. high.

The resistance of foliage to scorching by dinoseb depends on its having a protective waxy coating and if this has been damaged by rolling or wind abrasion or if the growth is soft, the crop is more susceptible to damage. It is not advisable to spray at all within 9 or 10 days of rolling. A coarse spray makes the most of the crop's ability to resist scorching and the weeds' susceptibility to it.

MCPB

An alternative to dinoseb which is more effective where Californian thistle or docks are the main problems in peas is MCPB, which has an entirely different action to that of dinoseb. MCPB is chemically closely related to MCPA, a hormone-type weedkiller which acts by disorganising plant growth. Some plants contain enzymes which convert MCPB into MCPA and are damaged by it, but this feature is present to only a limited extent in peas, and most varieties will outgrow the effect of it. As with herbicides in general its influence on yield depends on the degree of depression caused by weed growth.

Asparagus

As previously mentioned perennial weeds are not likely to become a problem other than in asparagus, where the land cannot be cultivated thoroughly for several years. Scope for chemical weed control in this crop depends on the fact that there are periods in the year when weeds are susceptible, but the asparagus has no growth above ground to be affected.

Couch grass has been controlled successfully by an autumn application of 5 lb per acre of dalapon followed by a repeat dose in spring if growth continues. Dalapon acts on the couch by absorption through the leaves and translocation to the roots. The absorption depends on active growth of the leaves and therefore applications are likely to be most effective if made early in autumn before the growth rate has fallen off, but when the asparagus bower has died.

Rates considerably in excess of 5 lb per acre have been used without damaging the asparagus, but where control can be achieved at the low rate it is obviously undesirable to incur the expense of a higher one. The possible materials for controlling broad-leaved weeds are monuron at 1 to 2 lb per acre or MCPA at 1 to 2 lb per acre applied before spear emergence and/or after harvesting has ceased.

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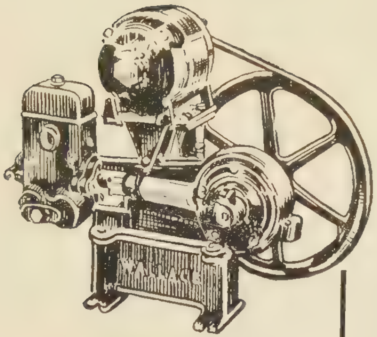

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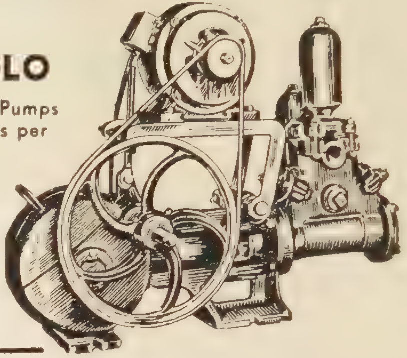

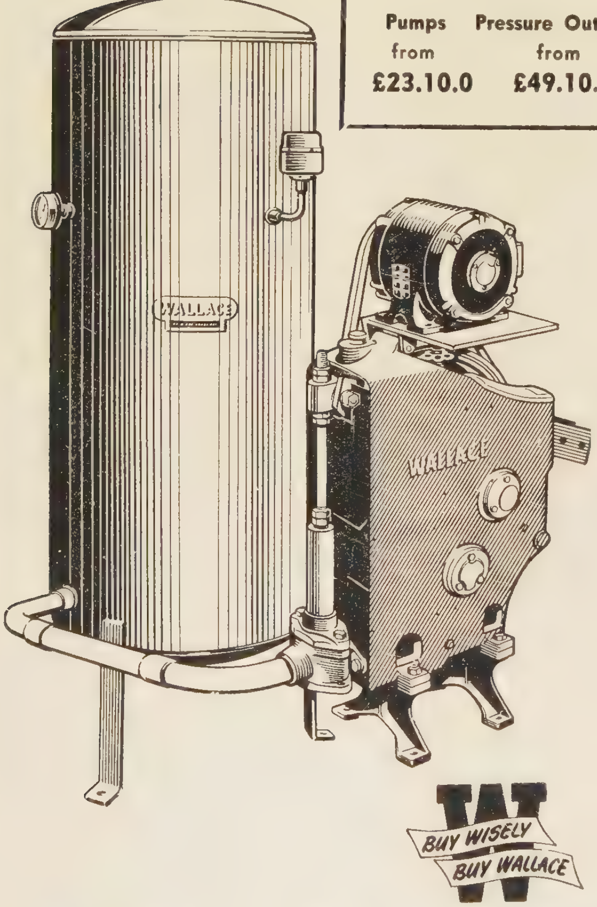

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Lucerne Variety Trial at Invermay

By R. S. SCOTT,
Scientific Officer, Department of Agriculture, Invermay Research Station

LACK of information on the relative merits of lucerne varieties under different climatic conditions throughout the country could well account for the almost complete predominance of N.Z. Certified lucerne sowings. This variety may well be the most suitable, but it is hoped that a clearer picture of the productivity and growth characteristics of promising varieties will arise from a New Zealand-wide assessment being attempted by the Department of Agriculture. Some of the results to date at Invermay Research Station are reported in the following article.

THE Invermay trial was sown in autumn 1957 on first-class land (alluvial silt loam) of the Taieri Plains. All varieties were compared with N.Z. Certified lucerne. They included the French varieties Du Puits, Provence, and Socheville; Hunter River, an Australian variety favoured in New Zealand some years ago; and two varieties from the Argentine, General San Martin and Saladina. Also included in the trial were two creeping varieties, Rhizoma and *Medicago glutinosa*.

Evaluation of the varieties was made by frequent observation and mowing and weighing at the hay stage. At each cut grass and weeds were separated from the lucerne and on samples from two of the cuts leaf/stem determinations were made.

Though mowing did not give the ideal evaluation of the creeping varieties and often involved the cutting of some varieties not quite at the hay stage, the trial did give initial information on varieties suitable for further investigation.

Establishment

Plant counts taken after germination indicated good, even establishment of all varieties. Six weeks after sowing Du Puits, Provence, and Saladina were the most promising varieties. All were erect growing, with the exception of the two creeping varieties, which were semi-erect.

Growth of most varieties continued through to April. Of particular interest at this stage was the extremely high production of the two Argentine varieties. Hunter River also gave high production, but had the disadvantage of more pronounced frost susceptibility.

Late Autumn Hay Cut

To prevent the varieties from drawing on their root reserves and thereby suffering from reduced vigour in spring the first cut of the trial was delayed until June. Results confirmed the high production noted previously from Hunter River and the Argentine varieties. Of the remaining varieties Du Puits was the most promising, while the creeping varieties had insufficient growth for mowing.

Frost Resistance and Hormone Spray Damage

A number of seedling docks (*Rumex* spp.) appearing in the trial in April were successfully controlled by spraying with 1 lb per acre of the sodium salt of 2,4-DB. The opportunity was taken of comparing varietal resistance to spray damage. It was found that varieties most susceptible to frost damage were also most susceptible to spray damage. These varieties were Hunter River and the two Argentine varieties.

LUCERNE YIELDS

	Cuts					
	13/6/57	16/10/57	6/1/58	4/3/58	21/4/58	Total
	lb of dry matter per acre					
N.Z. Certified	270	1,590	4,520	4,060	1,060	11,500
Du Puits	350	1,410	3,830	3,860	1,030	10,480
Socheville	170	1,090	4,510	4,100	1,100	10,900
Provence	250	1,530	4,140	4,090	1,440	11,450
Rhizoma	Nil	860	3,850	3,430	100	8,240
M. glutinosa	Nil	1,130	4,090	3,780	130	9,130
Hunter River	540	Deleted from trial because of infection with fungous disease (see text)				
Gen. San Martin	440					
Saladina	890					

Spring Production

Provence was the most productive variety in early spring, being the first to break winter dormancy. Over the month from mid August to mid September Du Puits made vigorous growth and was nearly as good as Provence. N.Z. Certified and Socheville were slightly poorer and *M. glutinosa*, though low producing, was superior at this stage to Rhizoma. Hunter River and the Argentine varieties had barely broken dormancy.

A fairly dense infestation of annual poa became evident in early spring; the weed was least dense in varieties which produced well in the previous autumn—Hunter River and the Argentine varieties.

In mid October the trial area became infected with a soil-borne fungus (*Sclerotinia trifoliorum*) causing stem rot. It was difficult initially to determine whether the disease was more prevalent in any particular variety, but subsequent performance of the varieties gave evidence to suggest that the disease was confined largely to Hunter River and the Argentine varieties. They showed a rapid decrease in vigour and number of plants and were deleted from the subsequent trial results.

First Cut

The first cut in spring was taken earlier than desirable (mid October) to enable the area to be treated with 1 lb per acre of PCNB to control the stem rot. Yield results showed Provence and N.Z. Certified together giving highest yields, indicating the extremely rapid late spring growth characteristic of N.Z. Certified.

Samples were taken at this cut for separation into leaf and stem. It was found that the amount of leaf varied from 60 to 70 per cent of the dry weight of lucerne, with Socheville, Du Puits, and Provence giving less leaf than N.Z. Certified and the creeping varieties. These results were interesting, since they showed that eye estimation of leafiness tends to exaggerate these small differences.

Summer Production

In early summer Provence again appeared the most productive variety, followed by Du Puits and N.Z. Certified. There was a general decline in the amount of annual poa present, particularly in the higher-producing varieties. Though Rhizoma and *M. glutinosa* were rather low producing, their density and prostrate growth tendency gave good suppression of annual poa.

The second cut of the season was taken in early January, when N.Z. Certified and Socheville gave highest yields. This was the first time the latter variety had shown any promise.

Autumn Production

Before a hay cut was taken in early autumn different growth characteristics of the varieties were noted. N.Z. Certified and Provence were semi-erect, Socheville and Du Puits were erect, and Rhizoma and *M. glutinosa* tended to be prostrate. In the same order the varieties were rated as medium, coarse, and fine stemmed.

The hay cut showed an improvement in yields from Provence since the summer cut, and this variety was about equal to N.Z. Certified and Socheville. Du Puits and *M. glutinosa* were lower yielding and Rhizoma poor.

At this cut, leaf/stem determinations again indicated the small difference in leafiness between varieties—a range of 48 to 56 per cent.

Late Autumn Production

The final cut for the season was taken in mid April, when Provence gave yields considerably greater than other varieties. The two creeping lucernes gave virtually no production at this time of the year. There was again a build up of annual poa, which was densest in low-producing varieties.

Conclusions

Though the results from this trial are only interim and do not give an estimate of persistency of the different varieties, they indicate that the total season's production from N.Z. Certified is not markedly dissimilar from that of the three French varieties. However, each of these varieties appears to vary quite markedly in its time of growth. This is extremely important to farmers in Otago, where spring and autumn weather are not generally suitable for hay making. For this reason it appears that N.Z. Certified, though giving similar total yields to Provence, is preferable for hay because of its characteristic of giving maximum growth in late spring, summer, and early autumn. Where lucerne is grown for grazing on light land Provence may prove useful because of its early spring growth.

Results indicate that there is no marked difference in leaf/stem ratio between varieties included in this trial.

The creeping lucernes, of which *M. glutinosa* was consistently the higher yielding, appear to have no place on first-class land where lucerne is used only for hay.

Book Reviews

"Handbook of Trees and Shrubs for the Southern Hemisphere": Richmond E. Harrison

THE basic planting in our gardens is trees and shrubs, and there is increasing interest in the introduction and growing of South African and Australian trees and shrubs. Many of the woody plants grown in Europe are also successful here, and their requirements are different from those recommended in the colder European areas.

There has thus been a growing need for a sound reference book on ornamental trees and shrubs and Mr Harrison's book fills this long-felt want.

Basically it is a descriptive illustrated dictionary of ornamental shrubs and trees, but not timber trees, grown in New Zealand and the cooler parts of Australia. It describes both genera and species as well as the popular horticultural varieties of these plants; brief cultural recommendations are also given.

Care has been taken to check the names and descriptions of the plants and the author has followed the recently accepted method of naming plants, as recommended in the International Code of Nomenclature.

The text is supplemented by brief lists of plants for specific areas and purposes and of common names and their botanical equivalents.

The book is a useful guide to the growing of trees and shrubs and to their identification.

—*J.P.S.*

A. H. and A. W. Reed, Wellington. 38s. 6d.

"Westland's Wealth": New Zealand Forest Service Information Series No. 29

THE names Westland or the West Coast are to many New Zealanders synonymous with the words gold, coal, and timber. Unfortunately past reliance on extractive products such as gold and coal has developed an attitude that timber can be treated in the same way; that it can be felled indiscriminately, or in other words "mined".

In an endeavour to bring to the notice of the public the folly of this attitude the New Zealand Forest Service has produced a pictorial record which shows, as no words can convey, the results of the indiscriminate use of the timber resources of the region. The depredations of deer and opossums are also clearly illustrated.

The photographs, which occupy 59 pages, are excellent, and New Zealanders who are interested in the conservation and wise use of the nation's resources will find a study of this book rewarding.

—*R.H.S.*

Government Printer (1959). £1, post free.

Sensitive Selenium Test May Help White Muscle Disease and Ill Thrift Investigations

A METHOD of determining the amounts of selenium in soils, herbage, and animal tissues which may greatly assist research into white muscle disease in sheep and some types of ill thrift has been devised by J. H. Watkinson, Scientific Officer, Department of Agriculture Rukuhia Soil Research Station. Features of the test are that it is extremely sensitive and can be completed fairly quickly.

MR WATKINSON was assisted considerably by information from research on selenium already done by Dr F. B. Cousins, Senior Lecturer, Department of Biochemistry, University of Otago.

Lack of any means for precise determination of the very small amounts of selenium which plants may contain has seriously hampered investigations to date into the role of this element in animal health. A selenium content as low as one part in 100 million parts of plant material can be detected by the new method.

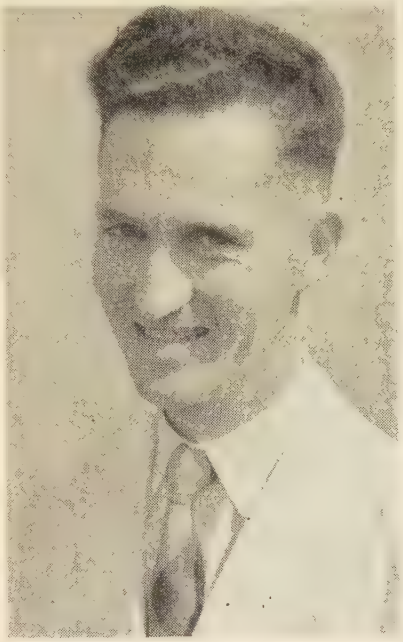
Significance of Selenium in Agriculture

Until about two years ago selenium was of importance in agriculture only because in certain regions of the world it caused poisoning in animals. However, recent work in the U.S.A. has shown that minute quantities of the element can replace vitamin E in certain vitamin E deficient diets. This discovery suggested to New Zealand research workers that white muscle disease in sheep, which responds to vitamin E treatment, and some types of ill thrift might be associated with selenium deficiency.

White muscle disease occurs widely in the South Island, particularly in Canterbury and Central Otago, and sporadically on pumice country in the Rotorua-Taupo area. Ill thrift in lambs which is thought to be due in part to selenium deficiency occurs in various parts of New Zealand.

In Department of Agriculture trials lambs affected by white muscle disease and some types of ill thrift have responded to selenium dosing, though this is still very much in the experimental stage.

An initial difficulty is that selenium is extremely poisonous; levels in feed as low as five parts per million are considered to be capable of producing chronic poisoning in animals. Because of this, selenium dosing in New Zealand has been closely controlled by the Department of Agriculture. The most effective dose or how frequently doses are needed is not yet known.



Mr Watkinson.

Serious Diseases

White muscle disease and ill thrift are a constant threat to farmers in many parts of New Zealand and as a result research work on a wide scale, involving the Department of Agriculture's research stations at Ruakura, Wallaceville, Rukuhia, Winchmore, and Invermay, the Plant Chemistry Division and Soil Bureau of D.S.I.R., and Canterbury Agricultural College, Lincoln, has been carried on. Many trials with selenium have been laid down by the Department of Agriculture's advisory officers.

Details of investigations and progress were reported in the December 1959 issue of the "Journal" (page 559).

All research workers investigating white muscle disease are likely to benefit from the development of the new method by which minute amounts of selenium can be determined accurately. More rapid progress can now be made in determining when herbage is, or becomes, deficient enough to affect the health of animals grazing on it, and the dose rates needed to compensate for any natural deficiency can be assessed.

However, this does not mean that any safe means of selenium dosing or application by farmers will be available in the near future. Farmers can arrange with their local veterinarian or Department of Agriculture office to have dosing done (where white muscle disease has been diagnosed) or a selenium trial made (where the type of ill thrift associated with selenium deficiency occurs.

Piglets' Weight Gain Unaffected by Iron-dextran

MANY suckling litters fail to grow as rapidly in the second and third week of life as in the first and fourth week. In the belief that if precautions are taken against anaemia, weight gains will be improved, many commercial pig breeders feed or dose piglets with some form of iron during the suckling period. Easily assimilated iron-dextran compounds that have recently become available have stimulated interest in such precautionary dosing.

In trials at the Department of Agriculture's Ruakura Animal Research Station with administration of iron-dextran, significant differences in haemoglobin levels between treated and untreated groups of piglets at two and three weeks old were evident, but there were no accompanying differences in live weight gains. The compounds are expensive and appear to serve no useful purpose for routine treatment of new-born pigs.

The majority of suckling litters in New Zealand have access to pasture and soil from birth to weaning. At Ruakura all litters are put out to pasture at two days old. It is therefore unlikely that farm reared litters would normally suffer from nutritional anaemia. Other possible causes of the reduction in weight gain are being investigated at Ruakura.

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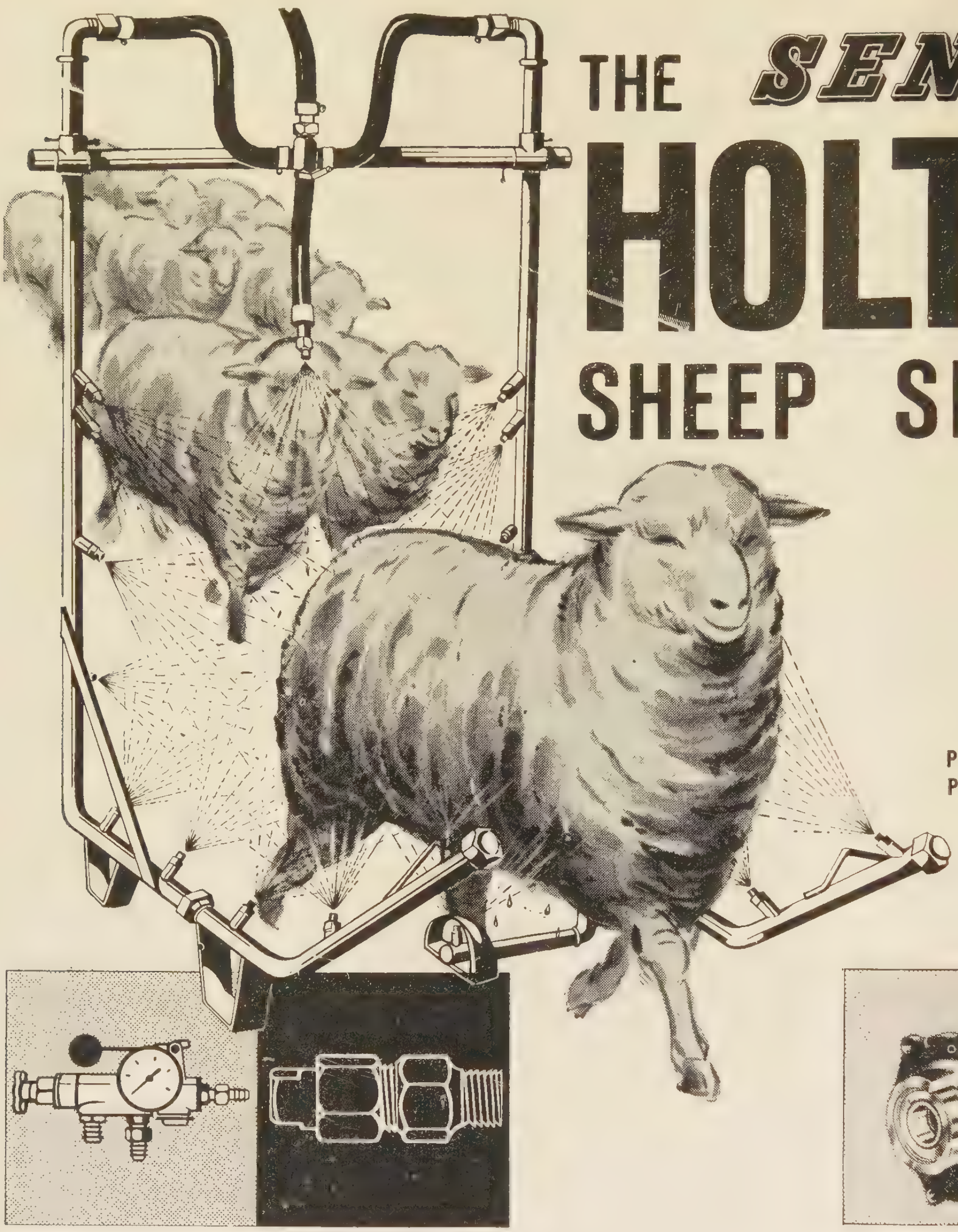

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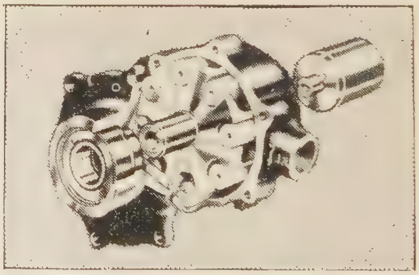

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Removing Surplus Honey

Seasonal Notes for the Domestic Beekeeper

By D. A. BRISCOE,
Apiary Instructor,
Department of Agriculture,
Tauranga

THOUGH honey may still be coming in in some districts, most of the honey crop will now be in the hives and beekeepers should have some idea how much is going to be harvested.

A FINE, warm day should be chosen to remove surplus honey from the hive. The combs should first be examined to ensure that the honey is well ripened and all combs are fully capped. Fully capped combs and combs up to 90 per cent capped are suitable for removal. Uncapped honey is usually described as not ripe; in other words, it still has too high a water content. If it is taken off the hive, it will sour or ferment later.

A bee escape board in position and the super of honey being removed after the bees have passed down through the escape. The bee escape is in the centre of the board.

Removing the Honey

Surplus honey may be removed in several ways. The beekeeper with only one or two hives can do it very efficiently with a proper bee brush. With this method the outer comb is removed from the super and the adhering bees dislodged in front of the hive. Then in quick succession each of the remaining combs is lifted out and brushed separately. It is advisable to have an empty super near the hive stand or on a barrow to accommodate the combs of honey that are brushed free of bees.

Excessive smoke should not be used, as this could cause the honey to become tainted, and care must be taken that the bee brush does not become clogged with honey, as this will infuriate and kill the bees and make brushing both difficult and uncomfortable.

Bee Escape Boards

An alternative method of removing surplus honey is to use a bee escape board, which is simply a flat cleated board of the same dimensions as a super. It is fitted with a Porter bee escape which allows the bees to pass through in one direction and prevents them returning in the opposite direction. Escape boards are placed underneath the honey supers and the bees, finding themselves cut off from those in the brood nest, pass through the Porter bee escape to join the rest of the hive and are then unable to return.

Success with escape boards depends on good equipment and the way the beekeeper does the work. Before the escape board is placed in position the escape should be examined to make sure that it is in good working order

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and not blocked by dead bees or pieces of wood. Burr comb on the frames between the supers will restrict the exit of the bees and this should be removed.

When the escape board is in position the entrance of the escape must be the correct way up. If the manipulation is carried out in the evening and if there is no brood within the honey super, the super should be free of bees the following morning.

Extracting Honey

For beekeepers who have no honey extractor a simple method of handling the honey from one or two hives is to scrape the sides of the comb with a fairly worn tablespoon. The honey and wax are scraped off down the midrib, but some care is necessary, as it is very easy to scrape a little too deeply and tear or damage the combs.

These combs are returned to the hives to be cleaned by the bees and are thus saved for further use.

With the use of a colander or other straining device to receive the scrapings the honey will drain through into the receptacle and leave most of the wax behind. The honey should then be strained through a cheese cloth or fine muslin and allowed to stand for a day or so to allow any small wax particles to float to the top, where they can be skimmed off

Granulation

All honey will granulate in time, but usually the quicker the process of granulation is, the finer is the grain. Quick granulation is usually achieved by the addition of up to 10 per cent of "starter" honey and the storing of the packed honey at a temperature round 55 degrees F for a few days or so.

Use of Starter Honey

Starter honey is smooth-grained honey usually held over from the previous season. When the starter has been thoroughly mixed or stirred into the honey, the crop may be then run off into jars or other such containers and if possible stored at a temperature of about 55 or 56 degrees F.

◆

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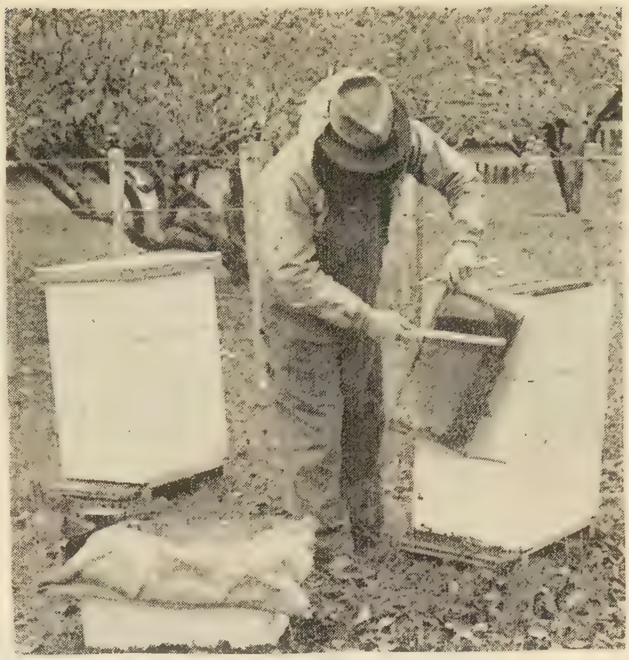
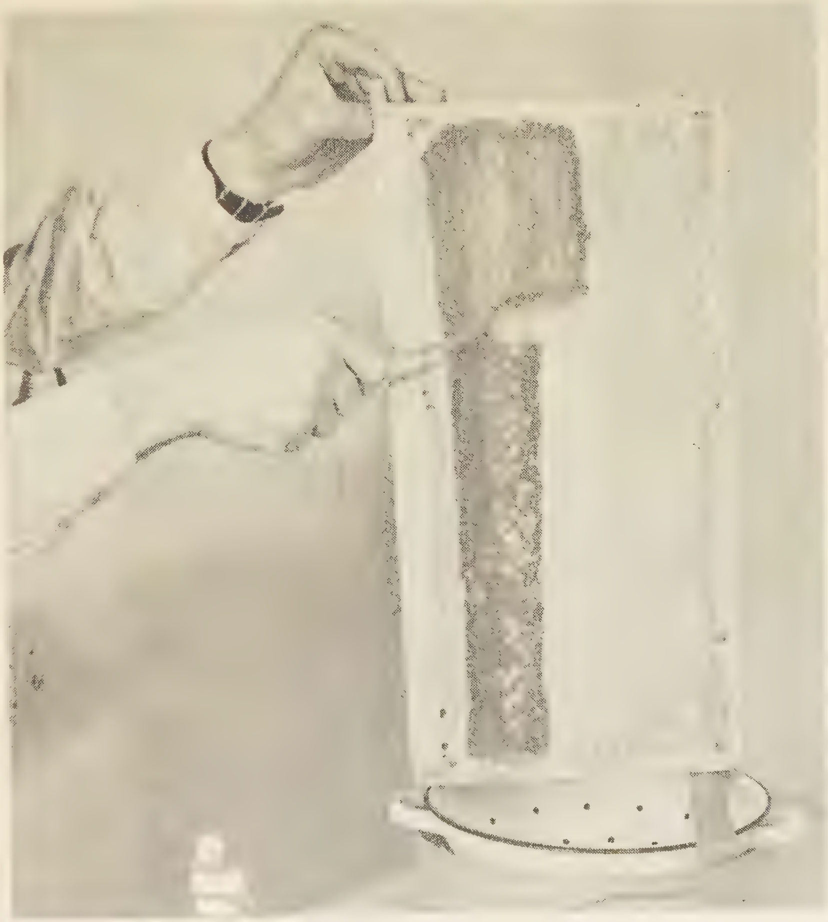
REMOVING SURPLUS HONEY



Removing combs → singly and brushing the bees down before the hive entrance. Care must be taken that the bee brush does not become clogged with honey, as this will infuriate and kill the bees and make brushing both difficult and uncomfortable.



↓ To scrape the honey from a frame the frame is held vertically and the honey scraped downward with a spoon into the strainer. Care is necessary, as it is very easy to scrape a little too deeply and tear or damage the comb.

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Surface Drainage in Westland

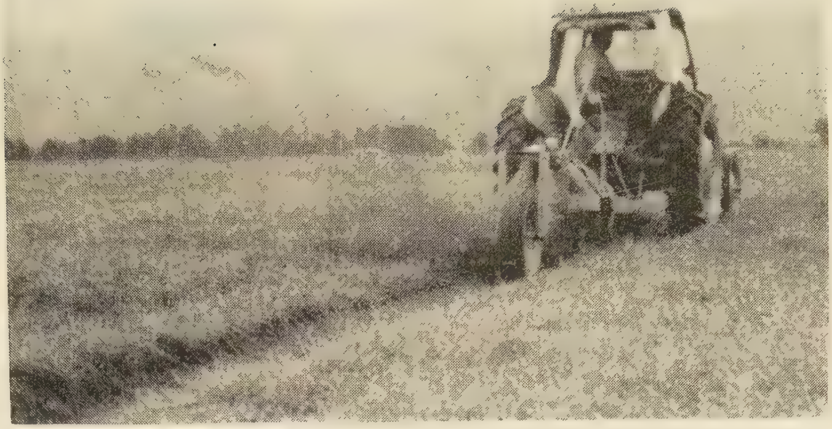
By J. M. LOCKHART,
Farm Advisory Officer,
Department of Agriculture,
Greymouth

IN Westland surface water can be a problem even on farms which have adequate open-drainage systems. Most of the farmed soils of the West Coast are reasonably free draining, but when rain falls at the rate of an inch an hour, as is not uncommon, pools of surface water are bound to form. This article discusses the different local methods used to remove this excess surface water.

ON the finer-textured soils and where the surface gets pugged water can lie in the pools for weeks, causing considerable harm to pastures. On farms where production is being increased the problem is intensified, as liming increases earthworm activity and encourages decomposition of the old fibrous turf mat; and pastures sown with the vigorous strains of improved grass and clover species are more open than old browntop swards. Hence, higher-producing pastures have not the same load-bearing capacity of old browntop "mats" and yet produce feed for greater numbers or concentrations of stock.

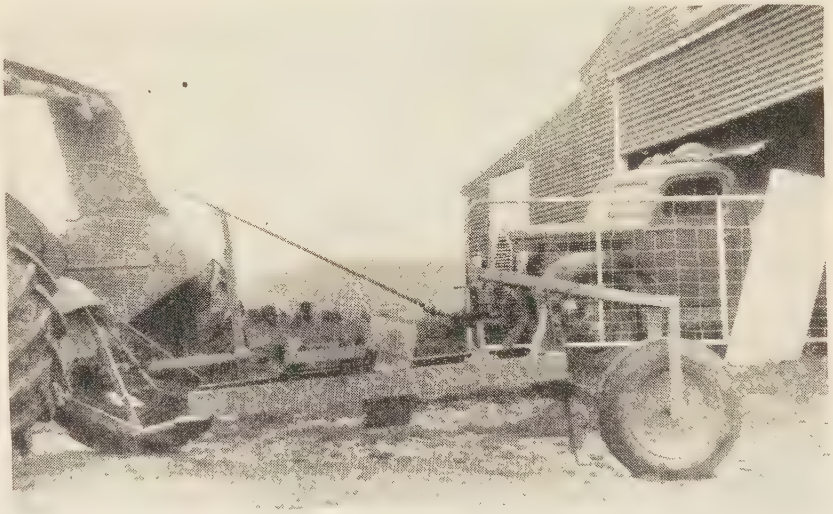
Drains in Cultivated Ground

It has been a common practice in many parts of New Zealand to use ploughing finishes as surface drains. The ploughing is done in lands ½ chain wide in the direction of the fall. Subsequent working is done so that the "finishes" are left in and the land built up to the "strike outs". Surface drains constructed in this way more than 30 years ago are still in use on the West Coast. A blade can be used to fill in any hollows and to increase the depth of the lower end of the drain.

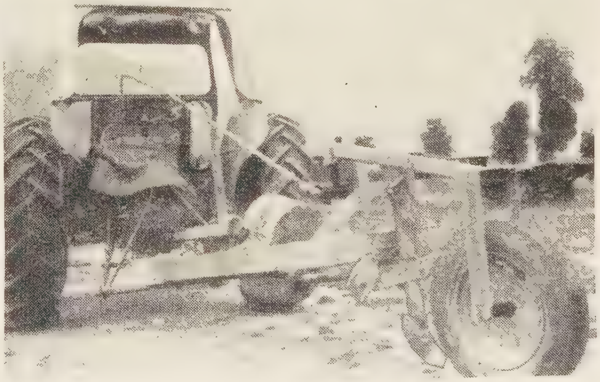


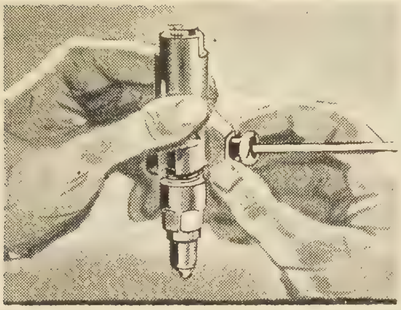
The spinner drainer in action. The soil is thrown out in a fine spray to the left.

▼ A side view of the machine showing how the power-take-off is fitted and the depth-control system. The machine will dig at least 6 miles of drain a day and clean old ones faster. Deeper drains can be made by double cutting and larger ones with three cuts.



A rear view → showing the blades more clearly. The ease and cheapness with which surface drains can be made with this machine have made it popular in the Kokatahi and Kowhitirangi districts and there are many other places in New Zealand where it would be useful.





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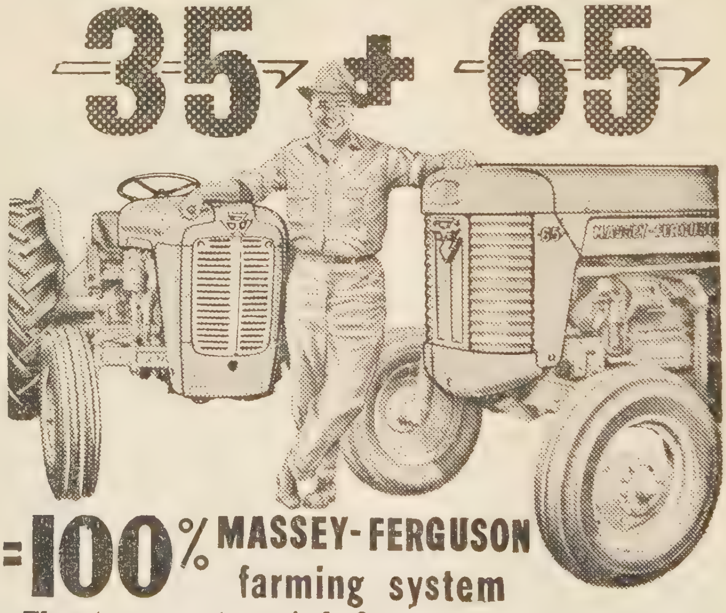

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The advantages of this type of surface drain are that most of the work can be done with the usual farm implements; little extra work is added to that already required for laying down a field to grass, and stock do little damage to the drain.

There are several points to watch in the construction of this type of drain. First, the drains must not be too long, 5 chains being the maximum limit on the West Coast, where the volume of water carried can become too great with added length. With heavy rain falling on soaked ground the run-off from each 5 chains by ½ chain land can be ¼ cusec, which is quite enough to add to the flow every ½ chain of the ditch along the lower end of the paddock. The greater flow from drains larger than 5 chains would overtax this ditch.

Secondly, in Westland where farmed lands are flat there has been little trouble through having too great a fall in this type of drain, but there would undoubtedly be trouble in some places. Safeness of slope would depend on intensity of rain, erodibility of soil type, and how soon cover could be established. If heavy rain falls before the pasture is properly established, this type of drain can be scoured out in parts and silted up in others. If this happens, it is advisable to wait until the grass becomes established, when the grass roots have a better hold on the soil, and then clean or grade down the drain where necessary.

Surface Draining Existing Pastures

Shallow surface drains are also needed for existing pastures and can be formed by hand or by ploughing out furrows. However, hand shovel work is hard and takes time, and drains installed with a single-furrow plough have the disadvantages that water is held back on the side on which the furrow slice is left and they are easily tramped in by stock.

These disadvantages are overcome when a "spinner drainer" is used. This ingenious invention has been developed in the Kokatahi-Kowhitirangi district. The machine was described in the August 1940 issue of the "Journal of Agriculture", and it is surprising that its use has not spread to other districts.

The mechanism consists of four blades on a mounting drawn behind a tractor. The blades are driven by the power-take-off through two shafts connected by a treble V-belt drive to increase the speed and absorb shock. The tractor must be fitted with an extra low gear. The revolving blades cut a channel 18 in. wide and up to a foot deep. Turf and soil fragments are thrown a chain or more, so that no soil is left on the side of the drain to impede the flow of water or passage of implements or to be trampled in again by stock. The depth of digging can be adjusted by turning the long arm, which, through an old car jack, raises or lowers the spinner mounting in relation to the trailing wheel.

Capacity of Machine

The machine will dig at least 6 miles of new drain a day and can clean old drains faster. Deeper drains can be made by double cutting and larger drains are made by taking three cuts, the first two being close together and parallel and the third scooping out the piece of soil in between. The paddock must be clear of stumps and stones.

The ease and cheapness with which surface drains can be made with this machine have made it popular in the Kokatahi and Kowhitirangi districts and there are many other places in New Zealand where it would be useful.

Feeding Working Dogs

DURING working periods a dog must have a full diet. Flesh and bones are good and such food is readily available on most New Zealand farms. A dog on light work requires 8 to 12 oz of meat without bone daily and a rib or other bone to chew about twice a week. For heavy work up to 2 lb per day may be needed. Feeding once a day in the evening is a sound practice.

Suitably prepared dog biscuits fed in the recommended quantities are also satisfactory. However, sudden changes from a predominantly meat diet to a biscuit diet and vice versa should be avoided. A dog fed on food other than flesh must be supplied with salt. Commercial dog biscuits usually contain 2 per cent.

Bones Essential

Dogs must be given bones, as without them the digestive system cannot function satisfactorily. A dog's stomach contains sufficient hydrochloric acid to dissolve bones, though they bury them to make them easier to digest. Putrefaction in the bones is harmless to dogs. Bones which tend to splinter, such as those of poultry or flat bones or vertebrae of cattle, should not be given to dogs, particularly older animals.

Minerals and Vitamins

Dogs seem to need more calcium than is provided in human diets. Young dogs, because they are building bone rapidly, and very old dogs, because their absorption of calcium is slow, require more than others.

A well balanced diet will contain sufficient vitamins for adult dogs, but pups and pregnant or lactating bitches should be given a few drops of codliver oil daily to provide sufficient of the most important vitamins (A and D).

A small quantity of opaque matter in the eyes of otherwise healthy dogs is a sign of vitamin A deficiency. Puppies are born with a poor store of vitamin A and should therefore have a few drops of codliver oil daily or 1 teaspoon a week.

Liquids

Dog housing should always make provision for adequate drinking water. Ideally water should be laid on to the quarters so that drinking vessels are frequently refilled with fresh water.

Dogs which are thirsty when let out will invariably make for water and drink heavily. They will then not be in good condition for work.

Separator strippings and skim milk are excellent for dogs.

—*A. D. M. G. LAING,*
Chief Advisory Officer (Hydatid Control), Department of Agriculture, Wellington

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The Home Garden in March

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

WHERE relatively low winter temperatures are experienced it is preferable to avoid overwintering the seedlings of most kinds of vegetables in the open, as they are liable to go to seed when the warmer weather comes if they have been subjected to long periods of relatively low temperatures. If sowing is necessary in March it should largely be confined to quick-maturing vegetables that are likely to succeed in the lower temperatures of late autumn. Toward the end of the month in some districts frost may be severe enough to check the growth of hardy crops and damage tender crops.

GARDEN work in March includes weed control, the sowing or planting of crops to mature before winter or to become established to the stage where full, rapid development can take place in early spring, composting, watering where necessary, and digging over and sowing vacant land with green crops. Shallots and onions can be harvested and the pods of peas and beans should be gathered before they are fully mature so that the growth of the plants will not be checked.

Vegetables for winter and spring use, such as cauliflowers, broccoli, leeks, savoy cabbage, and silver beet, should be kept cultivated and where necessary sprayed with an insecticide such as lindane or DDT and nicotine and fed with liquid manure to ensure that good growth is maintained.

Main crop potatoes can be harvested when they are mature. Earlier-sown crops such as lettuce, spinach, and silver beet can be thinned or seedlings can be planted out.

Celery should be sprayed with a fungicide (zineb or captan) against leaf spots and, in most northern districts, potatoes and tomatoes should be sprayed with bordeaux or other copper spray or zineb against late blight and with DDT or lindane against caterpillars.

The compost heap should be built up and rubbish infested with active insect pests or bearing the spores of long-lived or highly resistant diseases should be burnt.

The number of vegetables that can be sown now in most districts with prospects of their maturing before winter is comparatively small. Quick-maturing varieties of spinach, radish, turnips, and beetroot can be sown early in the month where conditions are mild, but even with these vegetables success in most districts depends largely on weather, situation, and favourable cultural treatment.

Soil for all the above vegetables should be well drained and rich in plant nutrients and humus. Quick growth is essential to good quality. The soil should be deeply dug and cultivated to a fine tilth. Soil lacking humus can be improved by the thorough incorporation of compost or well rotted farmyard or stable manure.

Seed can be sown ¼ in. to ½ in. deep in rows 12 to 15 in. apart. The ordinary type of radish can be sown in rows 6 to 9 in. apart or broadcast in prepared beds, which for convenience when radishes are being gathered should not be more than 3 ft wide.

Vegetables such as lettuce, silver beet, and cabbage or cauliflower can also be sown to mature in spring, but in the colder districts a warm, sheltered, well drained situation must be chosen.

The harvesting of onions and shallots is an important March job in many gardens and was discussed in last month's "Journal."

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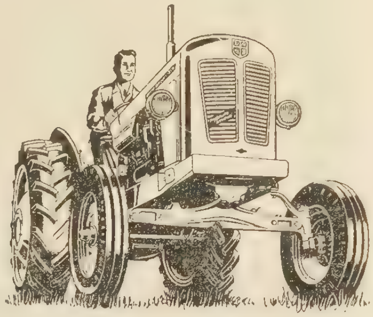

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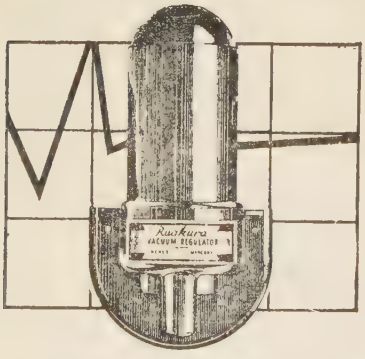

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NEW ZEALAND RAILWAYS

AUTUMN-SOWN CROPS FOR OVERWINTERING

Carrots

Late-autumn (March or April) sowing to provide carrots for spring use is not advisable where winter conditions are cold enough to check growth severely. Where winter conditions are relatively mild, seed may be sown later, but the aim in most districts should be to have the young plants well enough established to prevent their being lifted by frost; they should not be so large that severe winter weather will so check them that they run to seed with the advent of the better weather of spring.

Even in favourable northern districts raised beds are usually an advantage and a warm, sunny situation is necessary. Autumn sowing is generally rather risky and to ensure a continuous supply of roots throughout the year in most districts reliance should be placed on the summer and early spring sowings.

Onions

Though autumn sowing of main crop onions is fairly general practice in the North Island, it is rarely done in southern districts. In most districts late March or early April is considered the best time for autumn sowing. Onions if autumn sown in southern districts are not usually thinned, but are kept cultivated and grow on until about November or December, when they are used as "thick necks" without being encouraged to form large bulbs. In most northern districts, however, the plants are lifted in early spring and set out in rows 12 to 15 in. apart with the plants 4 to 6 in. apart in the rows.

Autumn-sown crops in some districts may not be successful and where winters are severe success depends to some extent on the season. Early frost will sometimes "lift" and damage the tiny seedlings of late-sown crops, whereas if the seed is sown too early or if a long period of mild weather precedes a very severe cold period, the plants may run to seed in spring before they have developed properly.

Though this is true of autumn sowing generally, in most districts in the north, where winters are less severe and mildew may be more troublesome on later-sown crops, the risks associated with autumn sowing and spring transplanting are not great. For autumn sowing the ground should be deeply cultivated and broken down to a fine tilth. It should be gently firmed, but care should be taken where the soil is heavy to avoid firming it too much, as the heavier soils tend to consolidate excessively where frequent winter rains occur.

If well rotted stable or farmyard manure is available, it is best incorporated sometime before the final preparation of the soil is begun. Best use can usually be made of such manure by adding to it about a thirtieth of its weight of superphosphate and applying it to land on which the crop is to mature.

If good-keeping onions are required, application of excessive quantities of organic manure rich in nitrogen is undesirable, as the bulbs may be stimulated into excessive leaf growth and weed growth is likely to be more troublesome.

Most home gardeners find farmyard manure difficult to get, but available organic matter such as compost, plus a complete fertiliser applied at about 3 to 6 oz per square yard, should be used. Because of variation in soils and their condition throughout New Zealand only local experience and knowledge can indicate fertiliser requirements, but if soil conditions are good and fertiliser is not placed too near the main root zone, heavy applications of fertiliser are usually desirable.

A fertiliser high in phosphoric acid but containing a liberal amount of potash and a smaller amount of slowly available nitrogen will generally give good results. The phosphoric acid and most of the nitrogen for early planted crops can be supplied conveniently by finely ground bone meal and the potash can be supplied by muriate or sulphate of potash.

The growing of onions on the same land for several years in succession is unwise where serious diseases are present, but otherwise has some merit, as several trials have indicated that production is likely to be higher on land where one onion crop succeeds another than where onions follow a different sort of vegetable.

The practice of growing successive crops of onions in the same ground probably arose from recognition of the high fertiliser needs of the onion and consequently the desirability of maintaining an area of the garden very high in fertility and regarding it as the onion bed.

However, rotation is just as important in growing onions as in growing other crops where diseases to which the crop is specially subject have built up. In addition most other vegetables grow well without further fertiliser on land that has received the heavy fertiliser applications usually given to onions.

Onion seed should be sown ½ in. deep at 10 to 20 seed per running foot in rows 12 in. apart in finely cultivated soil.

The growth of onions, unlike that of most other crops, is not usually seriously affected by moderate crowding in the rows, and provided the seed is not sown too thickly, thinning should not be necessary on most free-working soils. Good varieties of onions include Ailsa Craig and Straw Spanish for early crops and Pukekohe Long Keeper for main crops and long storage.

[Green and Hahn

In some districts tomatoes have to be sprayed regularly with zineb or copper oxychloride against fungous disease and with DDT or lindane against caterpillars.

Spinach

Spinach is quick growing, maturing under favourable conditions in from about 40 to 55 days. It is a useful vegetable for autumn sowing, because it is hardy when established under cool conditions. It can be sown throughout the winter in well drained and well cultivated soil that is not too heavy provided the seedlings can establish themselves without being "lifted" by frost. It will grow at temperatures only slightly above freezing, though the optimum-growth temperature is somewhat higher.

Though seed germinates at relatively low temperatures (40 degrees F or even lower), seedling emergence is usually delayed where there is frequent heavy rain. Germination is good at 50 to 60 degrees F, but the percentage decreases at higher temperatures.

Soil and Manure

Spinach thrives in cool conditions on a great range of moist, fertile, well cultivated, and well drained soils. It

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Somewhere out there in the darkness lies Pitcairn Island—that's where Fletcher Christian and his fellow mutineers landed after they ditched Captain Bligh. And talking of captains, the Old Man seems a bit restless tonight. Perhaps he's coming up to give Tim some more instruction on taking star shots. Very hot on star navigation, is the Old Man. And quite right, of course—though to hear him talk sometimes you'd think radar had never been invented.

Young Tim's watch wears on. But he's not the only one. There are watches down below, too. The ceaseless watch in the engine room, where the Third Engineer stands back a moment and wipes the sweat from off his brow. And for your information, Fred, the ceaseless watch on the temperature in the refrigerated cargo holds.

One of Harry Briggs' team (remember Harry ?) is checking on No. 3 Lower Hold right now. That's where *your* hoggets are, Fred. Amidships, the Third Engineer and his men are sweating fast and free, but further for'ard, Fred, your hoggets are nice and cool. 15° Fahrenheit. And only a single degree leeway—up or down.

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED is not tolerant of a high degree of soil acidity, and lime should be applied to most soils that have not been recently dressed, though too much may cause yellowing of the leaves because of a deficiency or unbalance of certain essential elements such as manganese or iron.

A good dressing of organic material such as well rotted farmyard manure or compost supplemented by a complete fertiliser with a ratio of about 1 : 3 : 1 or 2 : 3 : 1 of nitrogen, phosphoric acid, and potash applied at 1½ oz to 3 oz a square yard is advisable on most garden soils. As spinach is a leafy vegetable, extra applications of nitrogen may be supplied by liquid manure or a side dressing of nitrate of soda or sulphate of ammonia raked in along the line of row, but it should not touch the foliage.

Liquid manure is preferable where conditions are inclined to be dry, as abundant moisture is essential for high yields and good quality; growth should be reasonably quick, as otherwise some varieties tend to be tough.

Sowing of Seed

Seed should be sown thinly ½ in. to 1 in. deep in rows 12 in. apart. Plants can be thinned to 4 or 5 to 1 ft of row, though if sown thinly, thinning in the accepted sense is not essential unless conditions are dry or the soil is very poor; it can be confined to the removal of the young plants when large enough for use. In poor soil or in dry conditions crops that have been given generous spacing in the seedling stage usually "stand" much longer.

BEAN DISEASES

The principal diseases of half-hardy or tender beans in New Zealand are anthracnose, bean mosaic, rust, and halo blight. The last shows as small, greasy, water-soaked spots ⅛ in. to ½ in. in diameter on leaves, stems, and pods. It causes dwarfing or death of young plants or unsightly lesions that may make pods unusable. Halo blight is seed borne and in moist conditions infection is rapidly spread by rain splashes or insects. Generally the white-seeded pole beans are moderately resistant to halo blight.

Anthracnose is a fungous disease which forms dark brown, sunken lesions on pods and stems and a black discolouration of midribs and veins of the leaves. It is seed carried and though in New Zealand it does not normally cause as much damage as halo blight, it occasionally makes a crop unfit for harvesting.

Bean mosaic is quite distinct and a severe infection is characterised by a dark mottling and distortion of the young leaves. Stunting of plants is common in susceptible lines and pods may be small, reduced in number, or fail to develop. Many crops have a small number of infected plants, but only rarely is the amount sufficient to bring about serious crop loss. This disease is also seed carried and can be transmitted from diseased to healthy plants by rubbing and by insect pests.

Bean rust is caused by a fungous and is usually most severe from mid summer, particularly on late-sown crops. The first symptoms are pale yellow spots about 1/16 in. in diameter on the leaves. The spots later become raised and reddish brown pustules or spore masses develop, first on the undersides of the leaves and later on the upper surfaces. Usually a yellowish green halo develops round the rust spot. Where infection is severe the leaf may turn yellow. There are several strains of the disease and wet weather is conducive to its development.

Control consists of the destruction of infected rubbish, adequate spacing of plants, and the use of resistant varieties. (Westralia is worth a trial where the disease is established.) Early planting may be worth while in some districts to enable the plants to establish before the disease becomes epidemic. The fungicide zineb, if sprayed on regularly, gives good control. Colloidal sulphur sprays also give some control.

Methods of control of bean diseases generally include use of disease-free seed, sprays, and seed dusts (thiram and copper oxychloride have given fairly good results) and the use of resistant varieties.

SPRING CABBAGE AND CAULIFLOWER

Toward the end of the month the first planting of spring cabbage is made in some of the colder areas, though April is more generally preferred and plants may be set out successionally in May or through winter. The raising of cabbage plants was discussed in last month's "Journal".

Where autumn conditions are mild a quick-maturing variety of beetroot can be sown early in March.

Thrips and caterpillars may damage the seedlings and can be controlled with DDT. Grey aphids are also likely to be troublesome and can be controlled with nicotine or with lindane which will also control caterpillars and thrips.

Mildew is more difficult to control because it is difficult to wet the undersides of the leaves with the spray, but copper oxychloride is effective if a good sprayer is used so that the undersides of the leaves are wetted. A little household detergent added to the spray mixture sometimes helps.

Cauliflower can be treated similarly to cabbage, but as it is a more sensitive crop in the colder areas, it needs more favourable conditions.

SWEET POTATOES

As sweet potatoes or kumaras gain rapidly in total yield and as the table quality of mature tubers is better than that of immature ones, home gardeners usually leave the main crop in the ground as long as possible to obtain greater production. Where tubers are to be stored, however, digging should be completed before there is risk of low-temperature injury.

Even when tubers are not to be stored it is advisable to remove them promptly if an unusually early frost kills the tops, as rots develop in the foliage and sometimes penetrate to the tubers. When kumaras are mature enough for storage the skins should be reasonably firm. They can be tested by cutting. Mature tubers when cut dry rapidly and cleanly on exposure to the air.

Most varieties of kumaras are likely to be injured when the temperature falls to 40 degrees F (8 degrees above freezing point) and the keeping quality is so seriously affected that long storage is usually impossible. For best results the tubers should not be subjected to temperatures below 50 degrees F.

Storage

To ensure that their quality remains at its best from one harvest to another tubers should be handled with care. Badly damaged ones should be rejected and the remainder subjected to a period of fairly high temperature and humidity to cure them and enable wounds to heal. Temperatures from 85 to 95 degrees F and a relative humidity of 85 per cent are desirable during curing. They should then be stored in conditions of scrupulous hygiene at a temperature of not less than 50 degrees F.

THE HOME GARDEN . . .

Where small quantities are being stored a reasonably warm shed or cellar is usually suitable if the tubers are placed in dry sawdust or dry sand. Wrapping individual tubers in newspaper has been very successful. Deep placement in dry sand will prevent rats from getting to them.

Proper curing is as necessary as care in lifting and handling. Curing of a kind is usually done by gathering the tubers into heaps and leaving them for about a week, keeping them covered during rain or at night with their vines or old sacks. Where temperatures are sufficiently high quite fair results are usually obtained from this method.

By the time the tubers are ready for storage damaged ones which may have been overlooked have begun to decay and can be rejected. If tubers are to be properly cured in the field, they should be subjected to temperatures of not less than 70 degrees F, and fairly high relative humidity day and night for as long as 3 to 4 weeks or more. Such long curing is not usually practical in New Zealand because of the need to grow the plants for as long as possible. Curing for too long may also result in excessive sprouting.

The home gardener can rarely cure kumaras under ideal conditions. It is difficult even for the commercial grower unless large quantities are grown and stored, as a strict routine must be followed.

Fruit Crop Estimates for 1959-60 Season

THE following estimates made in December of the fruit crop for the 1959-60 season are in 000's of bushel cases. They are summarised from information supplied by field officers of the Horticulture Division of the Department of Agriculture. Districts producing less than 500 bushels of a variety are not shown, but are included in totals. District totals of more than 500 are rounded to the nearest 1,000.

FRUIT	DISTRICT								
	Auckland Province except Gisborne	Gisborne	Hawke's Bay	Wellington and Taranaki Provinces	Nelson Province	Marlborough	Canterbury and North Otago	Central Otago	Total 000 bushels
APPLES—									
Ballarat	63	4	85	3	16	6	13	1	191
Cox's Orange Pippin	10	2	93	4	150	12	19	9	299
Delicious	23	10	170	7	263	31	29	46	579
Dougherty	19	4	70	—	38	2	—	—	133
Granny Smith	130	8	180	7	147	4	3	6	485
Gravenstein	24	—	30	—	75	1	2	2	134
Jonathan	9	—	55	2	316	34	19	31	466
Sturmer	7	6	240	18	460	35	69	39	874
Others	124	8	255	10	223	20	49	50	739
Total	409	42	1,178	51	1,688	145	203	184	3,900
PEARS—									
Beurre Bosc	1	—	4	—	7	—	—	—	12
Louise Bonne de Jersey	1	—	26	—	1	—	—	1	29
Packham's Triumph	6	—	13	—	12	—	1	—	32
P. Barry	5	—	20	1	7	—	2	—	35
W. B. Chretien	11	1	95	1	55	1	7	13	184
Winter Cole	1	1	70	2	46	1	8	6	135
Winter Nelis	—	1	55	—	9	—	2	12	79
Others	14	—	10	1	15	2	10	7	59
Total	39	3	293	5	152	4	30	39	565
OTHER FRUITS—									
Peaches	114	20	425	2	57	7	12	122	759
Apricots	2	2	6	—	—	—	23	173	206
Nectarines	2	2	16	—	1	—	2	31	54
Plums	70	3	52	—	10	2	12	23	172
Cherries	—	—	1	—	2	3	2	10	18
Quinces	7	1	7	1	1	—	1	—	18
Total	195	28	507	3	71	12	52	359	1,227
BERRY FRUITS—									
				Total in tons					
Boysenberries	6	3	15	5	13	—	4	5	51
Currants, Black	—	—	1	24	4	—	60	—	89
Currants, Red	—	—	—	—	—	—	—	—	—
Gooseberries	—	—	2	155	3	—	12	—	172
Loganberries	1	3	1	10	—	—	10	—	25
Raspberries	2	1	25	125	287	2	350	41	833
Strawberries	390	12	15	57	7	1	101	72	655
Total	399	19	59	376	314	3	537	118	1,825

New Livestock Superintendent at Palmerston North

MR C. R. ENSOR has been appointed Livestock Superintendent in the Department of Agriculture at Palmerston North. He succeeds the late Mr W. D. Ross. Mr Ensor was appointed Deputy Livestock Superintendent at Palmerston North in June this year.

For the past 10 years Mr Ensor has been Veterinarian in the Department at Whangarei. He began his working life as a cadet in the Ministry of Works at Christchurch in 1935 and by 1938 was a draughtsman in that Department.

Mr Ensor

After war service from 1940 to 1944 Mr Ensor was granted a rehabilitation bursary to take a degree in veterinary science at Sydney University. After his graduation he joined the Department of Agriculture at Christchurch in 1949 as a Veterinarian. He transferred to Whangarei the same year.

Mr Ensor is an authority on foot rot in sheep in New Zealand and was in charge of the Department's foot rot eradication scheme in Purua in Northland until his appointment to Palmerston North. In 1958 he studied foot rot research and control measures in Australia, his visit being financed by the New Zealand Wool Board.

Crop Production

By W. FAITHFUL,
Instructor in Agriculture, Department of Agriculture, Invercargill

THE steady decline in the production of oats as a result of farm mechanisation was to be expected, but oats nevertheless are still important in the economy of the Dominion. There seems to be no justification for the importation of oats when grain of superior milling quality can be grown here and yields are extremely high. The use of oats and oaten chaff as supplementary feed for stock can be increased substantially. On much of the higher fertility land used almost exclusively for lamb fattening a crop of oats can be included in a normal rotation without in any way impairing the fertility of the soil.

PRODUCTION of oats has declined primarily because of the replacement of draught horses by tractors. Another factor is the steady trend toward a grassland system of farm management whereby the acreage under the plough is kept to a minimum consistent with the production of brassica crops for winter consumption. As a result the crop rotation has been reduced and in many instances grain crops have been dropped from the rotation.

Oat growing nevertheless should still be regarded as important and included in the rotation on arable farms.

The following table shows the reduction in acreage of oats in the 30 years up to the 1956-57 season.

	For threshing acres	For chaff or hay acres	Green feed acres	Total acres
1926-27 ..	117,326	255,372	14,064	386,762
1936-37 ..	74,772	187,694	53,328	315,704
1946-47 ..	55,297	76,405	49,767	181,469
1956-57 ..	56,496	26,451	53,372	136,319

In 1926-27 the total quantity of oats threshed was 4,997,535 bushels, yielding 42.58 bushels per acre, while in 1956-57 there were 2,686,211 bushels threshed, yielding 48.6 bushels per acre.

There are three major considerations in present day oat growing. Primarily, the grain is required for cereal food, as the national breakfast would be uninteresting to many, particularly in the far south, without oatmeal porridge. About 500,000 bushels are required every year for production of cereal foods.

Secondly, oats are one of the best concentrated feeds for stock. The grain may be fed either whole or crushed or the crop may be cut and chaffed and fed to sheep and cattle during winter. A less important use is for the feeding of racehorses. As a rule Dun oats are preferred for this, as the variety has a light straw and provides a highly nutritious chaff. Another advantage of oats as a supplementary feed is that the crop may be held in stack for up to two or three years.

Thirdly, oats provide a very useful form of supplementary green feed at critical periods. This feed can be used for the flushing of ewes and is excellent for early lambing ewes, though prolonged feeding of green oats to in-lamb ewes dring winter is not recommended.

Oat Cropping

The oat crop fits quite easily into the rotation, as it may be sown either on land ploughed out of lea or after turnips, or on heavier land oats may be grown successfully after wheat. The sowing of oats after wheat is not recommended on light land, but on the heavier soils where lodging of the crop may create problems at harvest

Oats provide useful supplementary winter feed for dairy cows supplying town milk.

time, the sowing of an oat crop after wheat may be useful in controlling the prolific growth of the oats and thus reducing the risk of lodging.

Oats are a comparatively hardy crop and are tolerant of a fairly coarse seedbed. If the crop is autumn sown, small clods tend to shelter the oats during winter.

If the oats are the first crop out of lea, it is advisable to plough early enough to promote complete decomposition of the turf, and thorough preparatory cultivation should be undertaken before the sowing of the oats. If oats follow turnips or swedes, the land may be given sufficient preparation without ploughing, cultivation being by grubber, discs, and tine harrows. Time should be allowed between the various operations to permit mellowing of the land.

Sowing

The time of sowing and the quantity of seed to sow depend to some extent on the district and the use to which the crop is to be put. In Canterbury and North Otago a considerable acreage of oats is autumn sown, because the crop is used primarily for green feed during late winter and early spring, but may subsequently be saved for grain production or chaff.

The term "autumn sowing" has very wide application, as autumn sowing may be undertaken at any time between mid February and mid May, depending on the district and the season. However, sowing usually takes place between the end of February and early April, the sowing rate being between 2 and 2½ bushels per acre.

The varieties used for autumn sowing are Algerian, Dun, Achilles, Winter Grey, Russet, and Black oats. All these varieties may be grown in Canterbury, but the most popular is Algerian. Any oats autumn sown in Southland are usually carried on and harvested for grain in the following summer; the most popular variety in Southland for this purpose is Dun, but some Winter Greys are grown.

Newly harvested Algerian oats do not germinate satisfactorily if sown in February or March because of a natural dormancy in the newly harvested seed and the high soil temperatures usual at that time. By April or May soil temperatures are generally lower and the dormancy has disappeared. Germination at this period is therefore much more reliable. For February and March sowings the previous season's Algerian oat seed should be used.

Most of the oat crops in Southland and some in Canterbury and Otago are spring sown, usually during September and October. The crop generally follows turnips or swedes. It is not usual to graze off spring-sown oats. This has been done where crops have been sown very early (August), but grazing off is not satisfactory. If grazed too hard, the crop may be short and late and if lightly grazed, tends to ripen very unevenly. Spring-sown oats are therefore usually grown only for grain or chaff.

Varieties suitable for spring sowing are Onward, Abundance, and Milford. The spring sowing rate is 2½ to 3 bushels per acre in Canterbury and 3½ to 4 bushels per acre in Southland. Up to 5 bushels per acre is sometimes sown in Southland, 2½ bushels being drilled each way. This is done generally with the idea of combating lodging. This extra heavy seeding is not always successful, as crops which have been sown at 5 bushels to the acre have been known to lodge.

Fertilisers

The fertiliser dressing generally recommended for sowing with oats is

When required for chaff, oats are cut with the binder and stooked preparatory to stacking and later chaffing.

1 to 2 cwt per acre of superphosphate or reverted superphosphate. If, however, there is a risk of the crop lodging, and this applies particularly to strong land where oats follow turnips or swedes, oats may be sown without fertiliser. This will reduce the risk of lodging, but may lengthen the ripening period and thus delay harvesting.

Features of Oat Growing in New Zealand

Area grown	For threshing and chaffing	About 75,000 acres
	For green feed only	About 50,000 acres
Main growing districts		Canterbury, Southland, Otago, with green feed oats more widely spread
Most suitable soils		Moderately rich soil with adequate moisture and a cool climate, but the crop is fairly adaptable
Varieties	Milling	Onward, Abundance
	Feed grain or chaff	Algerian, Dun, Onward, Abundance
	Green feed only	Algerian, Achilles, Winter Grey, Russet
Normal sowing rates	Seed	2 to 2½ bushels in autumn; 2 to 4 bushels in spring (heavier seeding rate in Southland)
	Fertiliser	1 to 2 cwt of superphosphate
Normal sowing period		March to April if intended for green feeding. September to October if intended for grain or chaff only
Average yield		50 bushels per acre
Commercial bushel weight		40 lb

Harvesting

The old method of harvesting and probably still the best for obtaining grain of good quality is to cut the crop with the binder and leave it in stook until ready for either stacking or threshing. The ideal cutting stage is when there is a uniform yellow colour all over but before the greenish tinge is completely gone. The straw below the neck should be changing to yellow and the grain well filled, and it should be quite firm but not too hard. Ripening of a crop cut at this stage is finished off in the stook. Generally a high yield of grain is obtained, as the grain is not readily lost in handling.

The most popular method today is to windrow with the binder and pick up with the header, though some crops may be direct headed. Windrowing is often the only satisfactory method of harvesting where a crop has lodged badly. Direct heading requires the crop to be well and evenly ripened, and the grain should be hard before direct heading is undertaken.

Lodging

Lodging of the crop is one of the greatest hazards in oat growing and for a number of years the possibility of producing a variety that is resistant to lodging but which will compete in both yield of grain and milling quality with existing commercial varieties has been investigated.

Strong-strawed varieties known to be resistant to lodging have been introduced from overseas and breeding has been carried on at the Crop Research Division, Department of Scientific and Industrial Research, Lincoln. The British variety Milford is a comparatively short-strawed oat with definite resistance to lodging, but the grain is not particularly popular with millers, though it has been accepted commercially. This variety has been used as the standard in trial work throughout New Zealand against which other varieties and selections are compared.

The group of varieties included in trial work over recent years has consisted of Milford, Steel, Onward, and three selections bred at the Crop Research Division. Of these, Steel has shown promise. It is longer in the straw and more resistant to lodging than Milford and is not as prone to straw break as Onward. Steel has also outyielded Milford in several trials, but is even less acceptable to millers. The three Crop Research Division selections have all shown some weaknesses and disadvantages such as lateness, straw break, or low yield.

The breeding and selecting of varieties resistant to lodging is, however, still being carried on. The introduction of a variety capable of standing up under adverse weather and high

The binder is used to windrow oats intended for threshing.

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Windrowed oats are threshed with a header harvester fitted with pick-up attachment.

fertility conditions becomes increasingly necessary with the present trend to harvest by windrowing or direct heading wherever possible.

Millers' Requirements

A high-quality milling grain is the primary requirement of the miller. A plump grain with a high yield of meal and, preferably, but not essentially, with a thin husk is ideal.

Any white oat is acceptable for milling, but the preferred varieties are Onward and Abundance. Coloured oats, if of good quality otherwise, can be milled but are not popular, even though the kernel of the coloured oat is white. The coloured oat has a dark husk and odd ones are likely to be chopped up in the milling process and will appear as black specks in the finished product. This is objected to by the housewife.

The millers' preference for a white oat should always be taken into consideration when oats are being autumn sown. Most of the oats preferred for autumn sowing are coloured and therefore are not acceptable for milling.

Varieties

Onward: This is the most popular oat with millers. It is a heavy-headed variety with a one-sided panicle; the straw is coarser than that of Abundance. It does not lodge readily, but unfortunately is very prone to straw break when the crop is ripening. The grain is short and plump. It is a good chaffing oat. It was raised by Gartons Ltd. of England and introduced to New Zealand in 1937.

Gartons Abundance: Until the introduction of Onward this was the most popular white oat and for many years the grain was used as the basis for judging oat quality, Garton A being the hallmark of the high-quality milling oat. Abundance has an open panicle and is rather coarse in the straw. The grain has a comparatively thin husk and yields a good percentage of oatmeal. It is more susceptible than Onward to lodging, but not to straw break.

Milford: This is a comparatively recent introduction. It has an open panicle and is a stronger-strawed variety than Onward and does not lodge so readily. The grain is plump, but there is usually a fairly large proportion of groats (shelled grain or dehusked oats in the threshed sample), which are very easily damaged during the kiln drying process before milling and are inclined to bake. This gives a slightly burnt flavour to the processed oatmeal. The grains are also rather variable in size.

Steel: This oat was bred by the Swedish Seed Association, Svalof, Sweden, and introduced into New Zealand by the Crop Research Division in 1948 for testing. A quantity of seed was imported commercially in 1950. This variety has been used extensively in trial work on resistance to lodging. The straw of this oat, which is taller than Milford, is fairly coarse. More recently grain of this variety has not been acceptable to millers and the variety is being withdrawn from Departmental trials.

Achilles: This variety was bred at the Dominion Rust Research Laboratory, Winnipeg, Canada, and was obtained by the Agronomy Division, Lincoln, as an unnamed hybrid in 1937. It was named Achilles by the breeder, J. N. Welsh, in 1943 in honour of the New Zealand cruiser which took part in the Battle of the River Plate. This oat has good green feed production, but its recovery after grazing is poor. The grain is not suitable for milling.

Algerian: This is the most popular oat in Canterbury and the northern part of the South Island, and practically no other variety is used throughout the North Island. Algerian oats are usually autumn sown. The ability of this variety to supply winter grazing and yet yield a good crop even under very adverse conditions, together with its resistance to rust, are factors responsible for its popularity. The straw is fine, the panicle open, and the grain long and narrow. It is not usually classed as a milling oat. As mentioned previously, newly harvested grain has a low germination owing to "dormancy". This characteristic is lost a month or two after harvesting.

Dun: This autumn-sown variety is popular in the southern part of the

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South Island. The growth habit in the early stages is prostrate, with high tiller development. The straw is very fine and of medium height and the panicle is open. The grain is long and narrow. It is not classed as a milling oat. The high tiller development allows winter grazing under severe climatic conditions and the variety has the ability to produce a good crop of chaff the following summer. The chaff is fine and of high quality and is much sought for racehorses. Its popularity is largely due to a supposedly high proportion of oil in the grain.

Russet: Autumn sown, this green feed oat provides a good bulk of early feed and stands up to repeated feeding off. When closed up in spring the crop produces a good yield of chaff. It is a tall growing, heavy headed oat prone to lodging. The grain is a light straw colour. Russet oats are not grown very extensively, being more or less confined to some districts of mid Canterbury.

Winter Grey: This old English variety is winter hardy and may be grown successfully in the colder districts; if grown in high fertility land, the crop is prone to lodge. This crop is popular with some growers in Southland, but is grown rather more in Canterbury. It is a good green feed oat and will produce good chaff. The grain is similar in appearance to Duns.

Black oats: This type of oat is not very popular, though a few varieties are grown in restricted localities. Black Supreme is sown for green feed in parts of Canterbury and a limited acreage is sometimes spring sown in Southland for grain. Yields are generally good, and the grain is usually disposed of as feed oats to North Island districts.

Diseases and Seed Treatment

The most troublesome diseases of oats are two forms of smut, loose smut (*Ustilago avenae*) and covered smut (*Ustilago kolleri*), and two forms of rust, crown rust (*Puccinia coronata*) and stem rust (*Puccinia graminis*).

A greatly diminished but still important phase of oat utilisation—chaff cutting.

The spores of both smuts are carried on the outside of the threshed grain, so reasonable control may be obtained by treating the seed oats with a suitable seed therapeutant. The seed of all crops which are to be harvested, either for chaffing or for grain, should be treated with one of the organic mercury dusts before sowing. It is not necessary to treat the seed oats of a crop sown simply as a green feed crop. The seed must be treated efficiently so that all grain comes in contact with the dust, because even under the best of conditions disinfection is rarely complete. The quantity of dust recommended is 2 oz per bushel of seed.

There is no known treatment for the control of either stem rust or crown rust. Of the two species of rust, stem rust is the most destructive. In oat breeding work, rust resistance is always a consideration of some importance. Late-maturing varieties and late-maturing crops are usually more severely attacked than those which mature early. The severity of attack also depends to some extent on the season; in a late year and particularly when this is associated with second growth in the crop, rust infection can be extremely severe.

Oats are also prone to damage by leaf spot fungus (*Helminthosporium avenae*), which appears as red-brown patches on the young leaves and persists there until the time the crop is threshed, when it is then freely dislodged and deposited on the outside of the grain. The disease is usually controlled by treatment of the seed grain with one of the mercury dusts.

Another condition, which seems to be more prevalent in some seasons, is known as "blast". Where this trouble is present a number of the spikelets contain no grain, but instead a white thread-like filament is seen. This appearance may be a symptom of several conditions including infection by cereal yellow dwarf virus, which is spread by aphids. The reduction in grain yield can be fairly substantial in a badly affected crop. At present there is no practical method for field control of this disease.

The control of diseases in farm crops generally is not easy, but in oat crops the control of smuts and other fungi the spores of which are carried on the outside of the seed is simplified to some extent; even so complete control is seldom achieved by seed disinfection. It is therefore necessary to apply the treatment before sowing to all seed of crops intended for threshing. Control of diseases such as rust depends more on the raising of varieties resistant to attack.

Oats are occasionally converted into silage. In this instance a forage harvester is working on a rather lodged crop.

ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture Trials and Experiments

Wallaceville

Detection of 1080 in Poisoning Cases

Work in progress at Wallaceville Animal Research Station is showing that it is not always possible to detect 1080 poison in the flesh and organs of poisoned sheep. Experimental work on poisoning sheep at the lowest possible fatal level of 1080 is indicating that where sheep do not die for 30 hours or more after receiving a fatal dose it is sometimes impossible to detect the poison by chemical analysis. If the sheep die in 12 to 16 hours from the same low dose, the poison can be detected. Usually where sheep are accidentally poisoned with rabbit baits, considerably above minimum fatal doses are eaten and the detection of the poison does not then present any difficulty.

Rukuhia

Sulphur Requirements of Pastures

Pasture topdressing trials laid down by farm advisory officers throughout New Zealand over several years have demonstrated that many of the superphosphate responses earlier attributed to the phosphate were due to the sulphur component. All stages from sulphur deficiency only to phosphorus deficiency only were found.

Some analytical guide was needed on the sulphur status of pastures. Since 1953 the plant analysis section at Rukuhia Soil Research Station has analysed clover and grass samples from various sulphur trials and fairly consistent evidence has been accumulated indicating that white clover and ryegrass at grazing height should contain about 0.25 per cent of total sulphur for best growth.

Ruakura

Chou Moellier Can Retard Germination and Root Growth of Pasture Plants

The presence of a germination and root growth inhibitor in chou moellier may help to explain why clovers and grasses often grow poorly in pastures newly sown after or in association with a chou moellier crop. At Ruakura Animal Research Station it has been shown under laboratory conditions that the germination of white clover seeds and the root growth of ryegrass seedlings are seriously retarded in the presence of chou moellier roots, stems, or leaves.

Attempts are being made to extract the toxic factor involved and to determine whether similar effects are produced in the field.

Wallaceville

Dieldrin Poisoning of Sheepdogs

Sheepdog losses through dieldrin poisoning, a diagnosis backed by recorded symptoms and chemical analyses of tissues, occur throughout every sheep dipping season. Deaths in a few instances have resulted from the deliberate misuse of this insecticide. For example, meat intended for dog tucker was painted with dieldrin dip concentrate to keep off the flies. In another case sheep carcasses were covered with dieldrin dust ostensibly to prevent dogs eating them, while a third case involved a dog bathed in dip concentrate. In about 80 per cent of the cases, however, there was no history of deliberate exposure and farmers could throw no light on the source of dieldrin.

Obviously sheepdogs throughout the country are subjected without harm to varying degrees of exposure to dieldrin as a "normal occupational hazard" associated with dieldrin dips, sprays, and dusts. During the passage of sheep through a treatment race each sheep gets only a single treatment with insecticide, whereas the dog working them may get many times this amount.

Investigations are now in progress at Wallaceville to find whether such multiple exposures can harm sheepdogs. One out of three dogs dipped once in normal strength sheep dip developed severe dieldrin poisoning; other animals given three treatments at weekly intervals with dieldrin dust or spray have so far shown no ill effects.

Exposure of sheepdogs to dieldrin in any form should obviously be kept to the minimum.

Winchmore

Soil Phosphorus in South Island

The forms in which phosphorus is present in South Island soils are being studied at Winchmore Irrigation Research Station by procedures which isolate the iron, aluminium, calcium, and organically bound fractions.

Results to date indicate a high proportion of calcium phosphate in recent alluvial soils and weakly leached high country soils east of the main ranges. This calcium phosphate is thought to be present as the mineral apatite, which is not available to plants.

Wallaceville

Oesophageal (Gullet) Drenching

Oesophageal (gullet) drenching is a recently introduced technique that has several advantages, especially with phenothiazine. Inserting the nozzle directly into the oesophagus enables a more accurate dose to be given; it can be given more rapidly than by dosing by mouth, and spilling of the drench, with subsequent staining of the fleece, is almost entirely eliminated. This technique is not suitable, however, for use with drenches such as bluestone and nicotine sulphate that must be swallowed into the fourth stomach to be effective. The bluestone in the drench, acting on nerve endings in the mucous membrane in the mouth, causes closure in the wall of the first stomach of the groove that carries the drench into the fourth stomach. With oesophageal drenching this action cannot take place and in many of the animals the drench will pass to the first stomach, where it is ineffective.

Wallaceville

Buttermilk as a Pig Food

A case in which pigs on buttermilk were not doing nearly as well as could be expected has recently been examined at Wallaceville. Analysis of several samples of buttermilk delivered to the piggery showed that the material had a nutritive value well below that of normal buttermilk and indicated that a large amount of water was diluting the food. Careful planning of diets for pigs can be rendered valueless in such circumstances. Farmers using buttermilk or whey should satisfy themselves that the material they obtain is not excessively diluted, and full cooperation of farmers and dairy factory managers is required to ensure this.

Ruakura

Fattening of Lambs

Over the years Ruakura workers have conducted trials to determine the effect on the growth rate of fattening lambs of the level of ewe nutrition during pregnancy and lactation, the stocking rate, and the grazing management of ewes and lambs from lambing onward.

More recently the value of creep feeding of lambs using a number of different proprietary feeds in pelleted form has been tested. Results suggest that such supplementary feeding is not economic, since feed taken from the trough merely replaces an equivalent amount of food which would have been eaten as pasture.

This year a trial has begun on the recently developed British system of creep grazing of lambs under which the ewes and lambs are rotationally grazed, but the lambs are allowed to creep through into the next paddock ahead of the ewes and so obtain the first pick.

Preliminary observations suggest that little benefit will result from this system unless the stocking rate is high enough to force the lambs to graze ahead of the ewes or unless the pasture type is such as to develop selective grazing behaviour patterns.

Wallaceville

Poisoning from Arsenic Foot Rot Baths

Wallaceville reports that arsenic foot rot mixtures are still the cause of the greatest numbers of stock deaths from arsenic poisoning. Even if a foot rot bath is emptied, rainwater collecting in the bath later is liable to have dangerous amounts of arsenic dissolved in it. Thirsty animals will drink arsenic solutions, but formalin poisoning from a foot rot bath has never been known to occur. Arsenic foot rot baths, whether or not they contain solution, should be kept inaccessible to stock when not in use. Sheep have been known to drink the arsenic solution on the way through the bath, and a watch should be kept to prevent this.

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Lambing Estimates for 1959 Season

The estimated number of lambs for the 1959 season and the estimated number of breeding ewes were the highest so far recorded. The Dominion total of lambs was 31,373,142, an increase of 334,061 over the number for 1958, and that of breeding ewes was 31,816,093, an increase of 938,545.

The lambing percentage of 98.61 was not as high as last year's 100.52 per cent, but it was higher than the next previous best, 97.27 per cent in 1953. The lower lambing percentage could be attributed to the drought conditions in a number of districts at tupping time.

Southland again had the best land district lambing percentage with 109.22. The South Island percentage was 103.77 and the North Island percentage was 94.20.

Totals for counties, districts, and the Dominion are set out in the following tables, which have been contributed by the Animal Industry Division of the Department of Agriculture.

NORTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1959)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	56,381	80.06	45,139
Whangaroa	22,851	87.89	20,084
Hokianga	53,696	79.03	42,436
Bay of Islands	137,472	88.36	121,470
Whangarei	168,378	88.32	148,711
Hobson	172,369	87.63	151,047
Otamatea	172,381	87.82	151,385
Rodney	202,470	88.37	178,923
Waitemata	145,127	89.37	129,700
Great Barrier Island	5,452	63.51	3,463
Manukau	115,636	89.42	103,402
Franklin	224,725	92.72	208,365
Totals	1,476,938	88.30	1,304,125

SOUTH AUCKLAND LAND DISTRICT

Raglan	669,639	91.37	611,849
Waikato	315,228	92.16	290,514
Waipa	268,299	98.24	263,577
Otorohanga	332,010	92.30	306,445
Waitomo	596,906	91.80	547,960
Taumarunui	493,556	94.20	464,930
Coromandel	51,406	91.03	46,795
Thames	22,182	88.00	19,520
Hauraki Plains	35,221	87.24	30,727
Ohinemuri	55,657	93.52	52,050
Piako	181,272	98.57	178,680
Matamata	463,057	100.38	464,817
Tauranga	252,325	97.03	244,831
Rotorua	330,008	84.96	280,375
Taupo	148,283	84.31	125,017
Whakatane	114,700	89.56	102,725
Totals	4,329,749	93.10	4,030,812

TARANAKI LAND DISTRICT

Clifton	124,946	90.27	112,789
Taranaki	53,864	95.90	51,656
Inglewood	87,999	98.22	86,433
Egmont	49,814	96.23	47,936
Stratford	249,499	93.25	232,658
Eltham	79,950	97.97	78,327
Waimate West	10,295	101.60	10,460
Hawera	103,124	98.65	101,732
Totals	**759,491**	**95.06**	**721,991**

GISBORNE LAND DISTRICT

County	Breeding ewes (as at 1959)	Estimated percentage of lambs	Estimated number of lambs
Opotiki	68,477	85.82	58,767
Matakaoa	70,686	85.38	60,352
Waiapu	270,229	81.76	220,939
Uawa	116,600	83.91	97,839
Waikohu	383,189	88.11	337,628
Cook	487,426	82.19	400,615
Totals	1,396,607	84.21	1,176,140

HAWKE'S BAY LAND DISTRICT

Wairoa	460,940	84.65	390,186
Hawke's Bay	1,254,305	95.84	1,202,126
Waipawa	562,866	102.85	578,908
Waipukurau	194,622	98.53	191,761
Patangata	652,831	92.47	603,673
Dannevirke	497,559	103.43	514,625
Woodville	128,579	102.14	131,331
Totals	3,751,702	96.29	3,612,610

WELLINGTON LAND DISTRICT

Patea	275,899	98.44	271,595
Waimarino	229,952	97.33	223,812
Waitotara	180,609	94.53	170,730
Wanganui	333,691	92.69	309,298
Rangitikei	1,125,402	94.34	1,061,704
Kiwitea	335,470	100.08	335,738
Pohangina	174,074	127.91	222,658
Oroua	313,589	109.58	343,631
Manawatu	202,645	103.81	210,366
Kairanga	135,213	103.06	139,351
Horowhenua	158,637	94.29	149,579
Hutt	84,263	87.28	73,545
Makara	54,053	80.43	43,475
Pahiatua	209,510	98.53	206,430
Akitio	178,161	95.58	170,286
Eketahuna	189,973	95.96	182,298
Mauriceville	62,255	92.93	57,854
Masterton	499,758	92.74	463,476
Wairarapa South	254,593	99.53	253,396
Featherston	405,384	98.64	399,871
Chatham Islands (provisional)	50,449	75.00	37,837
Totals	5,453,580	97.68	5,326,930

MARLBOROUGH LAND DISTRICT

Sounds	82,474	65.80	54,268
Marlborough	332,940	94.00	312,964
Awatere	187,502	87.10	163,314
Kaikoura	152,616	96.50	147,274
Totals	755,532	89.71	677,820

NELSON LAND DISTRICT

County	Breeding ewes (as at 1959)	Estimated percentage of lambs	Estimated number of lambs
Waimea	225,360	91.70	206,655
Golden Bay	49,245	89.70	44,173
Buller	3,644	87.90	3,203
Murchison	44,773	84.40	37,788
Inangahua	30,719	106.60	32,746
Totals	353,741	91.75	324,565

WESTLAND LAND DISTRICT

Grey	50,283	108.20	54,406
Westland	53,972	98.50	53,162
Totals	104,255	103.18	107,568

CANTERBURY LAND DISTRICT

Amuri	288,627	91.00	262,651
Cheviot	184,464	96.20	177,454
Waipara	378,288	110.00	416,117
Kowai	117,405	119.00	139,712
Ashley	92,352	100.00	92,352
Rangiora	84,171	113.80	95,787
Eyre	96,769	110.80	107,220
Oxford	131,370	108.20	142,142
Tawera	60,481	91.80	55,522
Malvern	251,444	106.70	268,291
Paparua	80,156	106.20	85,126
Waimairi	3,622	106.30	3,850
Heathcote	8,982	97.60	8,766
Halswell	24,206	107.70	26,070
Mt. Herbert	39,825	97.70	38,909
Akaroa	95,072	102.70	97,639
Wairewa	72,935	100.70	73,446
Springs	59,574	111.70	66,544
Ellesmere	134,968	117.80	158,992
Selwyn	227,044	103.70	235,445
Ashburton	1,419,887	107.50	1,526,379
Geraldine	416,981	98.90	412,394
Levels	322,111	104.40	336,284
Mackenzie	370,747	87.90	325,887
Waimate	750,328	109.90	824,610
Totals	5,711,809	104.65	5.977,589

OTAGO LAND DISTRICT

Waitaki	658,787	104.83	690,606
Waihemo	145,242	102.00	148,147
Waikouaiti	107,882	96.50	104,106
Peninsula	27,407	102.00	27,955
Taieri	247,388	93.00	230,071
Bruce	396,319	104.10	412,568
Clutha	771,033	105.90	816,524
Tuapeka	526,153	101.00	531,415
Maniototo	320,587	95.00	304,558
Vincent	338,355	96.00	324,821
Lake	176,901	82.73	146,350
Totals	3,716,054	100.57	3,737,121

SOUTHLAND LAND DISTRICT

County	Breeding ewes (as at 1959)	Estimated percentage of lambs	Estimated number of lambs
Southland	3,018,510	112.26	3,388,579
Wallace	985,412	100.03	985,708
Stewart Island	2,713	58.40	1,584
Totals	4,006,635	109.22	4,375,871

DISTRICT ESTIMATES

North Auckland	1,476,938	88.30	1,304,125
South Auckland	4,329,749	93.10	4,030,812
Gisborne	1,396,607	84.21	1,176,140
Hawke's Bay	3,751,702	96.29	3,612,610
Taranaki	759,491	95.06	721,991
Wellington	5,453,580	97.68	5,326,930
Marlborough	755,532	89.71	677,820
Nelson	353,741	91.75	324,565
Westland	104,255	103.18	107,568
Canterbury	5,711,809	104.65	5,977,589
Otago	3,716,054	100.57	3,737,121
Southland	4,006,635	109.22	4,375,871
Totals	31,816,093	98.61	31,373.142

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for 1959 and the previous five years and the number of lambs tailed.

Year	Number of breeding ewes	Estimated percentage of lambs	Estimated number of lambs	Actual number of lambs tailed
NORTH ISLAND				
1959	17,168,067	94.20	16,172,608	—
1958	16,422,976	95.43	15,671,645	—
1957	15,485,399	90.86	14,070,262	13,788,129
1956	14,611,500	89.16	13,026,961	12,899,166
1955	14,103,936	87.38	12,323,682	12,325,564
1954	13,529,687	89.63	12,126,101	12,444,533
SOUTH ISLAND				
1959	14,648,026	103.77	15,200,534	—
1958	14,454,572	106.32	15,367,436	—
1957	13,411,146	104.09	13,959,122	14,010,852
1956	12,311,700	100.37	12,356,739	12,597,109
1955	12,082,422	103.46	12,500,215	12,595,900
1954	11,320,843	103.01	11,662,121	11,794,656
DOMINION				
1959	31,816,093	98.61	31,373,142	—
1958	30,877,548	100.52	31,039,081	—
1957	28,896,545	97.00	28,029,384	27,798,981
1956	26,923,200	94.28	25,383,700	25,496,275
1955	26,186,358	94.80	24,823,897	24,921,464
1954	24,850,530	95.73	23,788,222	24,239,189

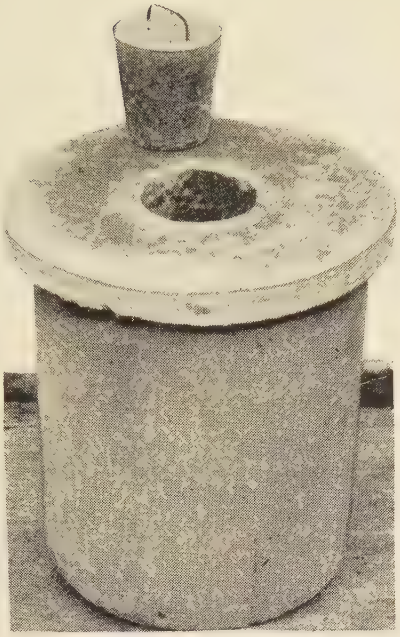
PREVENT HYDATIDS

Proper Offal and Carcass Disposal

By C. A. MARTIN,
Livestock Instructor,
Department of Agriculture,
Tapanui

FROM the outset of the hydatid eradication campaign it has been emphasised that denying dogs access to raw offal is the most important single factor. Regular dosing and testing of dogs at three-month intervals are classed as extremely important, but only as adjuncts to proper offal disposal or its sterilisation. Offal means everything that is taken from the carcass when an animal is killed—the lungs, liver, heart, spleen, all the stomach, and the intestines. In hydatid eradication this definition of offal is very important both for human health and the economic aspect.

OFFAL needed for dog food must be boiled for half an hour, and it then becomes safe, valuable, and palatable. Several types of offal sterilisers are available commercially, and their cost can soon be recovered through the food they produce.



This pipe cover with a plug will fit over an offal-disposal hole without damaging the sides of the hole. The plug is too heavy for a child to lift, and the hole is big enough to take offal with the paunch contents removed. The lid on the pipe can be lifted for disposal of a carcass which has been quartered.

Offal Disposal

Many farmers do not require offal for their dogs, and on their farms it is vital that offal disposal be effective. Burning is becoming the most popular method of offal and carcass disposal, and for hydatid and general infection control is the most effective.

Simplicity is essential in getting rid of offal, as farm killing, of mutton particularly, is very often a rushed job late in the evening after a full day's work. An easy method is desirable and one is provided by equipment made as follows: Cut the top out of a 44-gallon drum and nail two battens to the top to make a lid. Place the drum near the killing place; empty the paunch of the carcass, place all the offal in the drum, and keep it covered with waste sump oil. For convenience the drum can be kept on a small sledge and when full or when the weight limit is reached it can be taken away, emptied in a suitable place, and the material burnt, kerosene or diesel fuel being used to assist the lighting.

Raw offal can also be burnt by the following method: Take a drum as before; cut an additional hole in the side near the bottom; drive two standards through the drum about 12 in. from the top to hold an old implement seat or grate and place the offal on this; underneath light ½ gallon of fuel oil in a tin, and the offal will soon be incinerated.

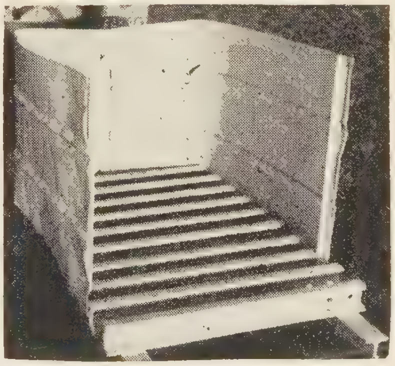
The deep-pit method of offal disposal is a good one and is more suitable for large properties where large amounts of offal have to be disposed of. A large pit is excavated and is covered with heavy timber and earth; a 44-gallon drum with top and bottom cut out is set into the covering at one end to act as a chute for material to be disposed of. One end of the drum is made into a lid for the chute. All offal is deposited into this pit, which acts in a similar manner to a huge septic tank. In such pits the use of benzene hexachloride sheep dip will overcome the fly problem.

Another and similar method is to dig with a post-hole borer a deep hole 15 or 18 in. in diameter and 10 to 15 ft deep. This can be covered with a length of cement piping, as in the illustration. If required, County Councils and Power Boards will dig the holes at reasonable cost on a farm to farm basis. The water level, of course, must be sufficiently low for this method to be efficient.

Disposal of Whole Carcasses

Carcasses lying about a farm are unsightly and can perpetuate many types of infection in addition to hydatids. An effective method of disposing of them is provided by a sledge type unit readily constructed from railway rails or similar material (see illustration below). This sledge can be towed round the farm behind a tractor and burning can be done in any paddock. Materials required are:

Old railway rails, of minimum 36 lb per foot weight (lighter rails will bend with heat)—two lengths of 5 to 6 ft (the "sledge runners"); 10 lengths of 3 ft to 3 ft 6 in. (the cross pieces).



A carcass destructor made from old railway rails with a surround made from two flattened 44-gallon drums. The surround, which may be made of sheet iron as described on page 175, encourages good draught for burning a carcass.

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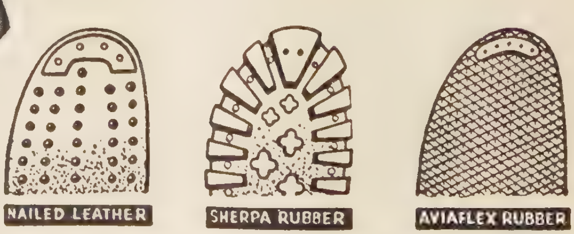
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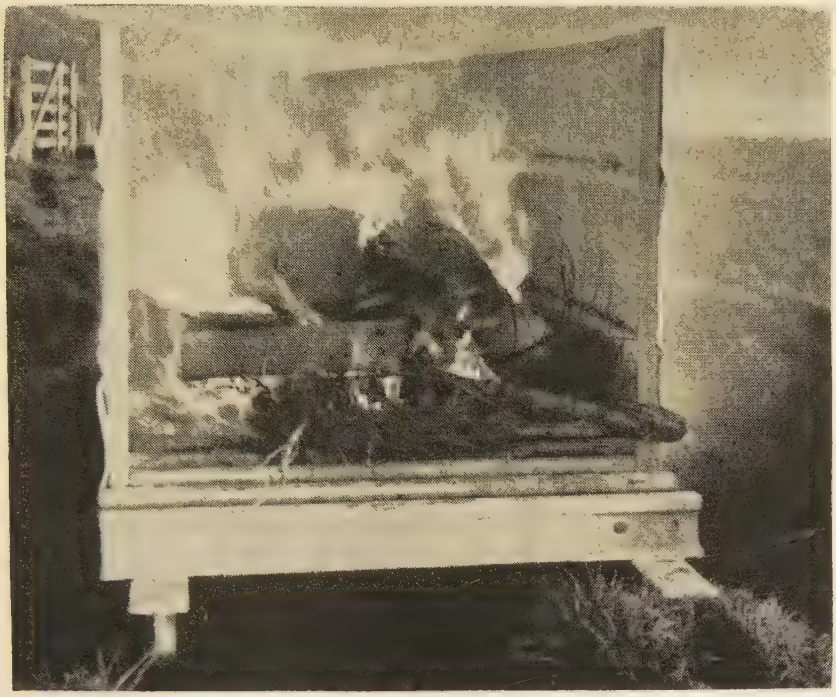

A carcass burns better when the closed end of the sledge faces the wind, and three carcasses burn better than one carcass.

▼ All that remains of the dead sheep is a small quantity of ashes.

Sheet iron, 15 ft x 3 ft x $\frac{1}{8}$ in. plate, of sufficient length to surround three sides of the sledge, as shown in the illustrations. Flattened oil drums may be used and are much cheaper, but only have a life of two to three years.

The sledge is built on the two runners, with the 10 cross pieces welded across at equal intervals.

A hook may be welded on at one end for towing with a tractor.

The sheet iron is welded round three sides to heavy-gauge angle-iron uprights at each corner.

The sledge will hold three carcasses.

Points on Firing

A limited core of heat is essential, and hay or preferably an old tyre is ideal. Old posts or one piece of wood in the middle help to "aerate" the pile and assist complete combustion. Only $\frac{1}{2}$ to 1 gallon of diesel fuel and old sump oil mixed 50 : 50 is necessary.

Cost

The cost is about £10 if oil drums are used, and £14 to £15 if $\frac{1}{8}$ in. sheet iron is used.

Burning Site

A central burning site can be established on any farm. For large numbers of carcasses this can be at the head of a gully facing a prevailing wind; when the wind is blowing and additional firing such as tree branches and similar inflammable material has been added burning will be effective.

Smaller numbers of carcasses can be placed on a raised grubber wheel, which makes an excellent burning platform, on iron rails placed across a special pit, or on the frame of an old grubber or something similar.

With small numbers of carcasses the main essential is a draught under them with a small fire kept burning at ground level; with a large number auxiliary firing plus a strong wind greatly helps burning.

On some farms a 44-gallon drum has been used to burn single carcasses. To begin burning a fire is lit under the grating at the bottom of the drum; as the carcass burns the ground level fire is maintained by the dripping fat, and the whole carcass soon burns.

Burying of dead stock is effective only if done properly and that means that they must be buried deeply. The use of mechanical equipment makes this possible on some farms. Stock buried in shallow holes can easily be scraped clear by hungry dogs.

Any equipment for offal or carcass disposal which does not give either immediate complete destruction by burning or immediate sterilisation by boiling for half an hour **must** be so constructed that the material cannot be got at by either dogs or by carrion-eating birds which could remove and leave it where it could be eaten by dogs.

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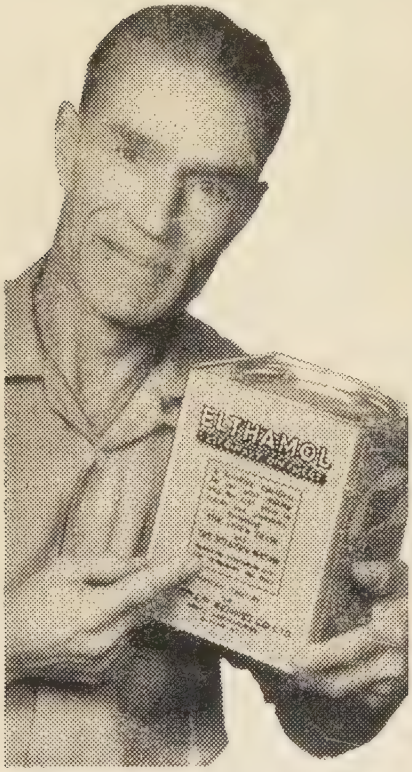

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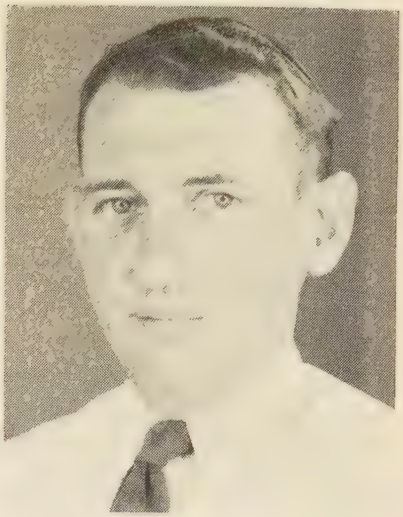
Weather and Pasture Conditions Associated with Outbreaks of Facial Eczema

By K. J. MITCHELL,
Officer-in-Charge, Plant Physiology Unit, Department of Scientific and Industrial Research, Palmerston North



Dr Mitchell.

AFTER the 1938 outbreak of facial eczema and the warning of it given by the Livestock Division of the Department of Agriculture, E. R. Cooper and D. Walker studied the weather associated with widespread outbreaks of facial eczema. It was found that the few major outbreaks recorded between 1916 and 1939 had occurred when temperatures during the whole summer and autumn (November to April) had been well above normal. They also emphasised the importance of high soil temperatures. Subsequently Levy and Smallfield, and more recently Filmer, emphasised that soil moisture conditions were also important, which had not been made clear by the investigations of Cooper and Walker.

COOPER and Walker had to carry out their work when very little information had been collected about facial eczema. Many people had regarded the 1935 and 1938 outbreaks as a new disease and there was certainly no accurate knowledge of its nature. Despite these difficulties and the limitations of their conclusions, Cooper's and Walker's work provided a valuable guide in subsequent years for recommendations concerning the danger periods. The main difficulty was that it remained uncertain how valuable deviations of temperature above normal early in the season, or for short periods during the season, were in forecasting outbreaks.

However, much more attention has been given to outbreaks of facial eczema since 1938. Seasonal reporting of its occurrence throughout New Zealand has been much more careful than previously. Detailed information on the time of incidence has been collected at the Manutuke Research Station for 15 years, and there have been considerable advances in the techniques for using general weather records to assess the soil moisture status and microclimate within pastures.

Accordingly, it seemed probable that a further examination of the situation should allow more precise understanding of the weather leading up to and associated with outbreaks. A comprehensive examination was therefore made of the very large number of weather records accumulated over the years from different stations. For some time before the discovery of *Sporidesmium bakeri* as the cause of facial eczema, evidence from the field, from controlled-climate work, and from the laboratory had strongly suggested that a fungus might be responsible. Consideration of the cycle of occurrence of other weather-controlled fungous diseases, such as potato blight, gave three suggestions as to the types of conditions to look for. These were:

1. There would be a general preconditioning of the soil and the pasture environment to make it favourable for rapid growth of a fungus.
2. The fungus would probably need a series of build-up periods before it reached a high enough level in pasture to cause liver damage. The weather required for these build-up periods would be similar to those associated with outbreaks of eczema.
3. The growth of the fungus would probably be determined by general levels of temperature rather than by deviation from normal for the district. As warm temperatures were obviously favourable for development of the fungus, temperature deviations would be a more reliable warning in a cooler district than in a warmer district.

When these principles of approach were used a reasonably logical pattern began to emerge from the complex mass of weather recordings.

Prior Assessment of a Season

It was found that a general idea as to whether a district was becoming conditioned to widespread outbreaks could be obtained from the soil moisture and soil temperature conditions during November and December. If the average for the 8 in. soil temperatures during November was over 62.5 degrees F, and if the main body of moisture in the soil (as distinct from surface layers wetted by showers) had reached a deficit of 1½ in. during November, it was a preliminary indication of possible future danger. The soil moisture content is judged by calculating for successive 10-day periods the balance between the amount of water lost by evaporation from the soil and transpiration by plants and the amount of water gained from rainfall.

A more definite lead was given by the conditions during December. There appeared to be a high probability of subsequent widespread outbreaks if during December the 8 in. soil temperatures averaged over 65 degrees F and there was no soaking rain. By soaking rain is meant quantities of rain greater than those required to completely wet the soil. The actual amount of rain needed for this depends on how dry the soil is before it rains. Such soaking rains in December are not considered to make the season automatically safe, but if soil temperatures are marginal, and particularly if rain is spread over several days, the probability of subsequent widespread outbreaks appears to be reduced.

This judgment of potential danger later in the season has been termed the proneness estimate. If the December criteria

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GROUP	NUMBER OF LAMBS	DEATHS	AVERAGE WEIGHT CHANGE	AVERAGE CARCASE WEIGHT
A—Untreated	22	7	— 7 lbs.	24
B—Cobalt dosed	12	nil	+ 23 lbs.	38
C—Cobalt bullet	10	nil	+ 24 lbs.	38

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for proneness have been met, the risk of considerable subsequent outbreaks is obviously high, but whether such major outbreaks occur depends then on the subsequent course of the season.

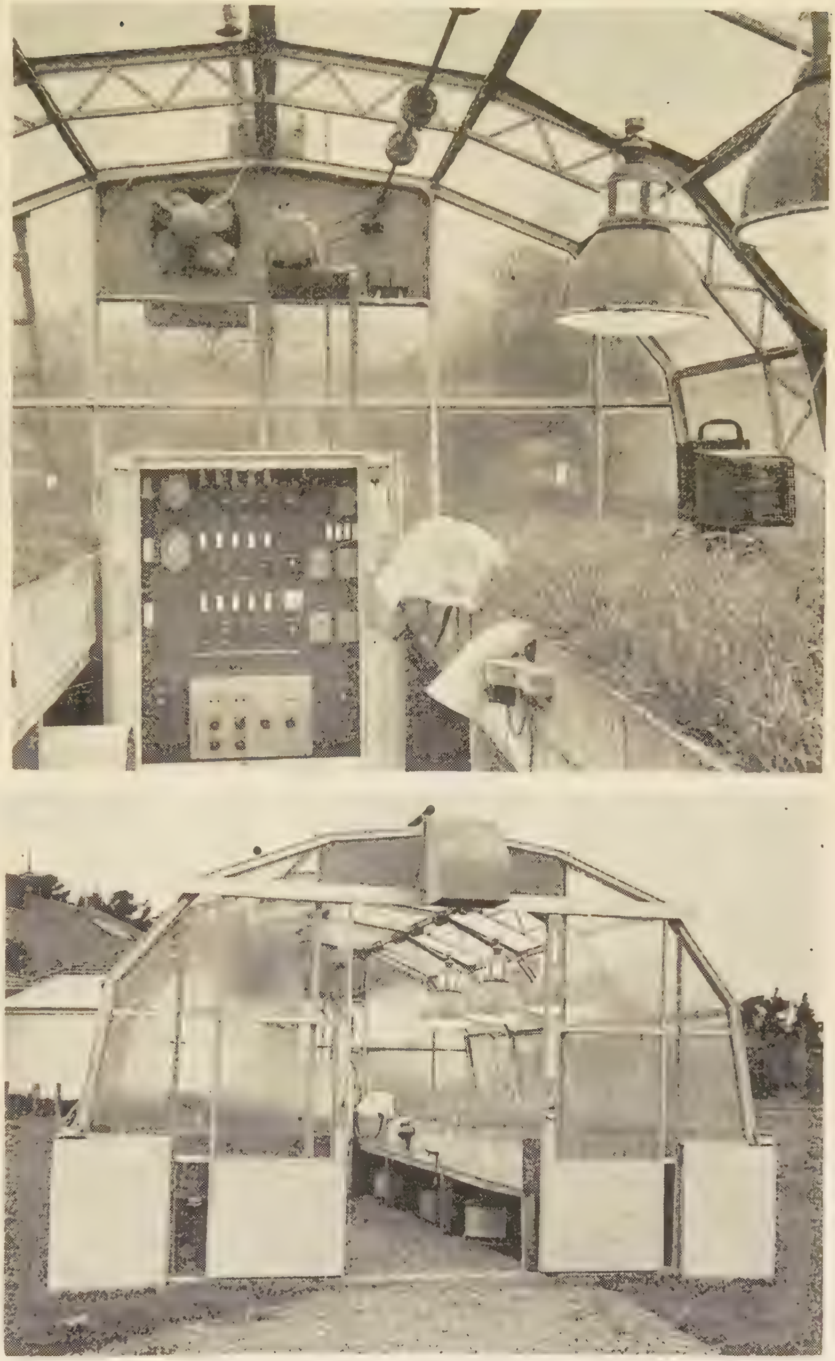
If the late summer and autumn become wet or cool or if they remain extremely dry, the chances of general severe outbreaks are much reduced.

Conditions Preceding Liver Damage

From an examination of the weather records for Ohakea-Palmerston North and Ruakura it appeared that the time when liver damage was first reported in a season was preceded by characteristic weather periods in which there were two or more successive days of high grass minimum temperatures combined with moderate rain. These conditions generally result from an inflow of warm, moist air and a period of muggy weather. There is a relatively low rate of drying out of the pasture after rain. The use of high grass minimum temperatures, which are a measure of the warmth of the nights, does not overlook the importance of warm days but takes into consideration that when there is a period of both high grass minimum temperatures and moderate rain there are also liable to be warm days with limited drying out of the pasture.

However, no definite conclusions could be drawn from the weather records for the districts mentioned, because in most seasons there was no definite information as to when outbreaks began. Fortunately, experimental work at Manutuke since 1947 allowed the timing of the periods when liver damage occurred on that station to be determined reasonably accurately. This made possible a better assessment of the relationships between periods of high grass minimum temperatures and the beginning of toxicity. It was found that the first occurrence of liver damage was preceded by at least two periods when falls of rain of greater than just a few points were accompanied by or immediately followed by two or more nights with grass minimum temperatures of 54 degrees F or over.

The same preconditioning effect could be produced by a single prolonged period (four to six days) of high grass minimum temperatures with rain. The rain which was judged to initiate the first toxic period (the first time at which liver damage occurred) was also associated with two or more successive nights of high grass minimum temperatures.


[*D.S.I.R. photos*

One of the climate-regulated glasshouses in which much of Dr Mitchell's research has been done. The houses were donated to the Plant Physiology Unit by the New Zealand Meat Producers Board.

At the moment it seems that only the high grass minimum temperatures which accompany the rain, or which occur within a day or two after the rain, are significant. High grass minimum temperatures on the nights before the rain do not count and averages of grass minimum temperatures for a week or a month are of limited significance.

It was noted that where a period of high grass minimum temperatures was associated with particularly heavy rain which continued for some days, the high temperatures' effectiveness in inducing toxicity or in preparing a pasture for toxicity was reduced. This would hold particularly where such heavy rain was not accompanied or immediately followed by some warm and fairly sunny days.

Examination of the weather records at Manutuke and for the Waikato and Manawatu showed that in some

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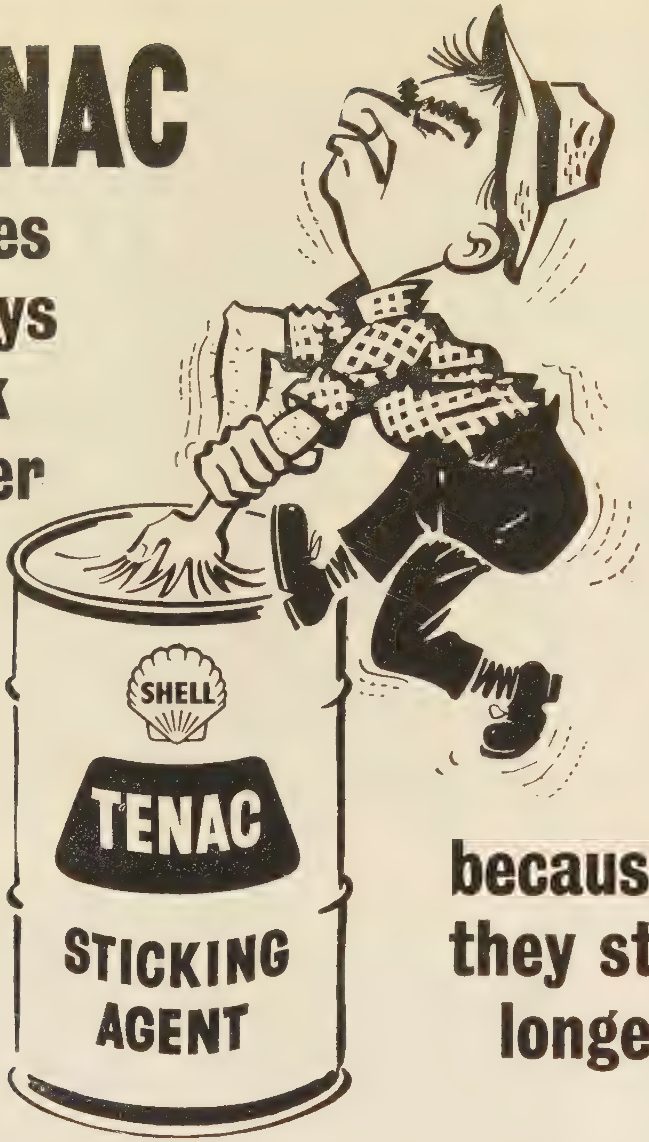

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TC1.9B

seasons which appeared potentially dangerous, these preliminary build-up periods had occurred early. In other seasons they did not occur until well into autumn and on other occasions they did not occur at all. Thus, provided due discretion is used, these early periods of high grass minimum temperatures and rain should indicate whether eczema precautions need to begin early or late in a season.

Precise information on the dates on which pastures have become safe but subsequently toxic again is not available. This has prevented any attempt at a precise study of relationships between the weather and fluctuations in toxicity during outbreak periods. However, recent studies under controlled-climate conditions, taken in conjunction with laboratory and field results, assist understanding of the position.

Growth of Fungus

The key information is that the environment required for rapid development of the fungus is temperatures fairly continuously within the range of 55 to 75 degrees F plus high humidity round the dead herbage in the pasture. Drying-out in the pasture checks growth of the fungus. Warmth gives rapid growth only if it is not accompanied by a decrease in the relative humidity in the pasture. Such drying-out often occurs on a sunny, clear day or a windy day. Also, though warm, wet conditions start the flush of growth by the fungus, continuation of these conditions for several days strongly reduces the amount of fungus.

The fungus does not grow at all vigorously on litter which remains soggy for long. It grows vigorously on freshly dead leaves or on well preserved litter with a high nitrogen content.

Sheep almost certainly take in some dead material when they are grazing a fairly short pasture. This could come from dead leaves which have not fallen to the ground and from the dead sheaths of old leaves which remain round the bases of the tillers from which the new leaves are growing. Probably, however, where there is appreciable growth of feed, as after rain, animals eat mainly live leaves. Therefore conditions governing the adhesion of spores to live leaves are probably important. Spores were found to stick easily to a wet leaf surface, but few stuck when the leaf surface was dry. Spores could be transferred from litter fragments at the bottom of a pasture to live leaves above them by rain splash, by disturbance from stock walking about, or by wind.

It was also found that there is a sharp distinction between the ease of wetting of the lower surface of a live ryegrass leaf and the difficulty of wetting live leaves of cocksfoot and paspalum, or for that matter the upper surface of a leaf of ryegrass.

On the upper surface of a ryegrass leaf rain or dew forms globules and runs off easily, leaving it almost entirely dry; on the under surface of a ryegrass leaf water spreads easily into a film, wetting the whole surface. Any disturbance of the leaf, as from stock treading, assists this wetting.

If the surface of the live leaf is intact and hardened, spores sticking to it remain dormant or nearly so. However, if there is any exudation of cell juices on to a wet leaf, rapid stimulation of germination of the spores and rapid growth of the fungus mycelial threads occur. This can happen within 12 hours. Growth of the fungus will continue provided the leaf surface remains moist and a supply of juices remains available. Once a leaf surface dries out or the supply of juices ceases, growth of the fungus stops, for the fungus does not attack or grow into live undamaged tissue. The juices could come from cut ends of leaves, from spots damaged by trampling or mowing, or from natural exudation from the leaves. This exudation is greatest on warm, moist nights, and probably increases considerably where there is soft, lush growth.

Short and Long Pasture

Two examples of the manner in which pasture conditions and weather probably interact come from consideration of the microclimate differences in short and long pasture:

- In short pasture on a fairly exposed site the microclimate will be governed mainly by the weather. Rapid development of the fungus is liable to take place with the onset of muggy conditions and rain. Once there is a change to clear sunny days and/or cold nights there will be an almost immediate decline in the humidity and in the night temperatures in the pasture.

Accordingly the growth of the fungus can be expected to decrease rapidly once there is a definite change in the weather away from muggy conditions, though high spore numbers may persist for a time afterward.

- If pasture is fairly long, particularly if it is in a sunny, sheltered position, the microclimate within the sward will vary less with changes in external weather. Long pasture will have two effects. Firstly it will maintain humid conditions within the sward for much longer after rain. Secondly it will act as an insulating blanket, reducing drop in temperature at night and rise during the day. In a long pasture factors such as spore distribution and suitability of the litter for rapid spore build up may prevent toxicity from becoming as intense as in short pasture. However, fungous growth in a longish and sheltered pasture is liable to persist much longer than in short pasture and is liable to rise to dangerous levels during marginal seasons.

Though there are many variations from these two examples, they have been mentioned to illustrate the range of factors which determine where and how much of the fungus develops. This applies not only during build up but during outbreaks. Consequently there will often be a great element of chance in whether toxicity occurs on a particular farm or paddock.

Some days of high grass minimum temperatures with moderate rain are a good measure of the period of muggy weather which is most likely to induce widespread and rapid development of fungus in pastures throughout a district. However, such measurements can never provide an accurate assessment of safety or danger which applies to the whole of an area. Conditions within the pasture and to which it is subjected, such as those already mentioned, can be of key importance in determining on individual farms and in particular paddocks the time of commencement, the intensity, and the duration of toxicity.

However, discretion in placing absolute reliance on any one set of weather criteria does not set aside the value of following weather conditions closely in judging the general liability to facial eczema danger within a district. Whether those conditions are described in terms of warm rains, of periods of thundery weather and showers, or of high grass minimum temperatures and rain, the association between periods of high toxicity and inflows of warm, moist air over a district during late summer and autumn is well recognised. The movements of these bodies of air are traced by the Meteorological Service. Forecasting of them and knowledge of their duration can, if considered in conjunction with the pasture environment on particular farms and paddocks, give a valuable guide to both warning committees, who have the general responsibility, and to farmers, who have to form the local judgments in deciding how to cope with circumstances arising during danger periods.

Summing up

Studies of weather have indicated there can be useful forecasting of the danger of outbreaks of facial eczema from the end of November onward. Judgments should be based on the course of the whole weather pattern rather than any single aspect. This should also allow improved assessment of the type of outbreak to be expected with various types of weather which may occur during late summer and autumn. Following the movement of warm, moist air masses can give short-term warning.

(Continued on page 183)

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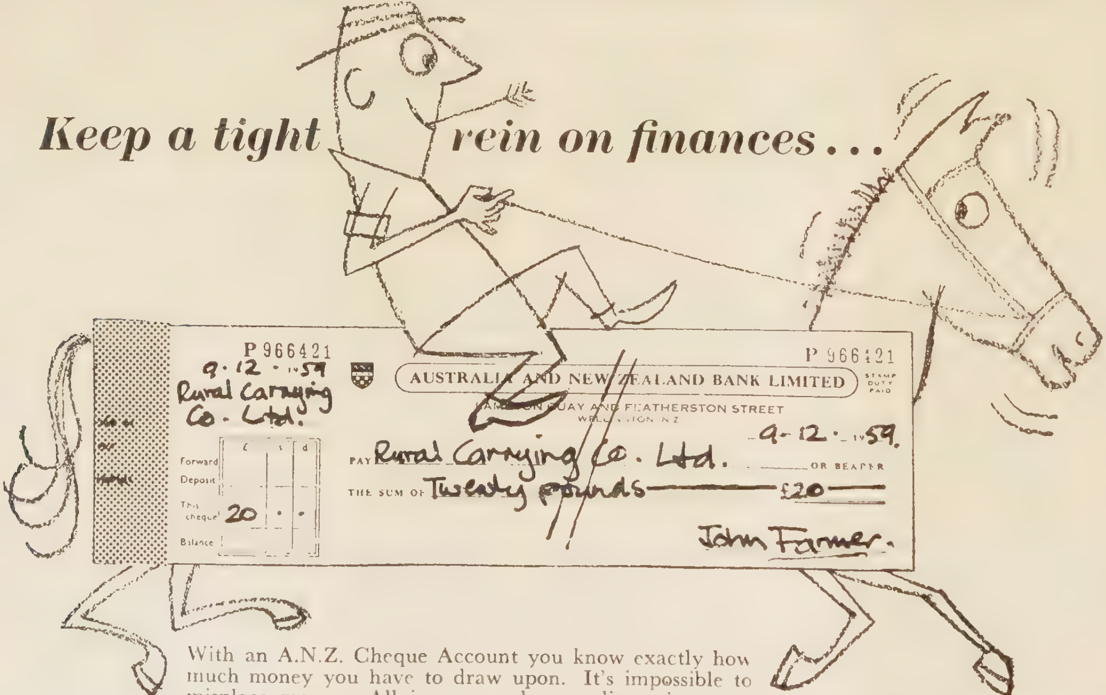
P 966421
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Protect Young Pastures Against Grass Grubs

WITHIN the top few inches of our lighter farmland soils the newly emerged generation of grass grubs is nearing the third month of its annual onslaught on the root systems of many thousands of acres of struggling crops and pastures. If you intend sowing down new pasture on light land within the next couple of months and know that grass grubs are present, it would pay you well to treat the soil chemically and so prevent new paddocks from being ruined. It is too much to expect new pasture plants to establish and thrive with stock eating at one end and grass grubs chewing at the other.

FOR three years' protection such pastures should be treated with DDT at a rate equivalent to 2 lb of 100 per cent of para para isomer per acre by spreading 2 cwt per acre of commercial dry-mix DDT superphosphate where many grubs are present, or the same rate of the slower acting wet mix preparation where there are few grubs.

At half this rate of DDT per acre the pasture will be protected for about two years, but as new pasture is normally sown with at least 2 cwt of superphosphate per acre, it is generally most satisfactory to apply the heavier rate of DDT.

Dry-mix DDT superphosphate is a mixture of DDT powder and superphosphate, which will separate out if applied under windy conditions or from a spinner top-dresser.

The wet mix is more stable, as during its manufacture the DDT is incorporated into the superphosphate particles.

The DDT mixture must be broadcast evenly over the paddock, because where the rate is low or strips are left untreated, grass grubs will thrive. For this reason it is not satisfactory to drill the seed and DDT fertiliser together, because grubs will often cause damage between the rows, even though the strips are only 3½ in. wide.

However, after a series of crops the ground may be temporarily free of grubs. Grass can then be drilled with superphosphate alone and DDT superphosphate applied in the following spring.

So plan now to protect your capital—money, time, and labour you are investing in your new grass paddocks—by adopting a policy of grass grub control which will cost **less than 3s. per acre per year.**

—*R. G. WARREN,*
Farm Advisory Officer,
Department of Agriculture,
Dannevirke

Facial Eczema

(Continued from page 181)

Examples of various situations are:

1 If a dryish and reasonably warm November is followed by a December which is warm and not extremely wet, the stage is probably set for danger.

2 If these conditions are followed by a warm, dry January, the main hope for avoiding subsequent considerable outbreaks of facial eczema during the rest of the season is that falls of rain with high grass minimum temperatures do not occur.

3 If November and December conditions have indicated proneness to danger and if there are also periods of rain with high grass minimum temperatures during December or early January, any subsequent warm rain should be suspect. If the approach of a vigorous tropical cyclone is reported, widespread preparations for the fullest precautions should be made without delay.

4 If November and December conditions have indicated definite proneness but are followed by a wet and reasonably cool late summer and autumn, chances of very severe widespread outbreaks are low. There will probably still be periods when widespread mild liver damage occurs and also sporadic clinical outbreaks.

5 Similar widespread occurrence of mild liver damage and sporadic clinical outbreaks are also likely even if soil moisture and temperature in November and December have not favoured proneness but there have been extensive periods of high grass minimum temperatures with rain during the season.

Much of this information was previously understood intuitively and in general terms by various people. A major value of recent work has been to allow statement of specific levels of soil temperature, soil moisture, warmth of rains, etc., which appear to indicate the borderlines between relative safety and definite danger. Provided that these levels are not interpreted too rigidly and the whole weather pattern is considered, a wide range of people can judge how a season is progressing and what danger may arise from the various sets of weather during late summer and autumn.

Duck Farming in New Zealand

By F. C. BOBBY,
Chief Advisory Officer
(Poultry),
Department of Agriculture,
Wellington

Hatching, Rearing, and Feeding

The rapid development of ducklings when properly fed is shown by the difference in growth between the four- to five-week-old Khaki Campbell ducklings shown above and the eight- to nine-week-old ducklings below.

BECAUSE of the limited market in New Zealand for duck eggs and for ducks as table birds commercial producers must aim for the greatest efficiency and economy on their farms. An article in the January "Journal" advised on the most suitable breeds and breeding methods, and this article instructs on hatching of eggs and rearing and feeding of ducklings; a third article, which will deal with egg production and table ducklings, will appear in the March issue.

Hatching of Eggs

EGGS for hatching should be collected daily and should be washed as soon as possible. They should not be subjected to long soaking in water before being cleaned. Provided all mud and droppings are removed, hatching eggs need not be cleaned to the same extent as eggs which are to be marketed.

There is little or no deterioration in hatching results with poultry eggs kept for seven days if they are stored under satisfactory conditions and turned regularly, but it is desirable to set duck eggs for hatching as soon after they are laid as is practicable. Much will depend on the time required to collect sufficient eggs to fill an incubator or give a setting for a cabinet machine, but duck eggs should not be held longer than seven days, and there is evidence that eggs held for even that period hatch better under hens than in an incubator.

V troughs containing wet mash are suitable on open runs for ducks and ducklings.

Eggs for hatching should be stored in a cool place, preferably where the temperature does not fall below 45 degrees F or rise above 60 degrees F. If they are kept for seven days, they should be turned daily. Turning daily is not necessary if the eggs are stored with the small ends downward. Cracked or rough-shelled eggs should be rejected. A good medium-sized egg of about 2½ oz is desirable; undersized and abnormally large eggs are better avoided.

As with poultry eggs, duck eggs may be hatched naturally or artificially. Hens are used for natural hatching and heavy-breed birds will cover 10 or 11 eggs. Putting too many duck eggs under a hen is not wise.

As the incubation period for duck eggs is 28 days (35 days for Muscovy ducks), the hens used should be fully broody, in good condition at the start, and free from vermin. Such birds may be freed of vermin by the use of nicotine sulphate, pyrethrum powder, or sodium fluoride.

An important aspect of hatching duck eggs is that they require more moisture than is necessary for hen eggs. Accordingly the hatching coop or box used for hens sitting on duck eggs should not have a wooden bottom and should be placed directly on moist or damp ground. This natural moisture is of great assistance in duck egg hatching. The floor of the coop may be made of a fine-mesh wire netting to protect the hen and eggs against rats or other vermin. The nest itself should be made of a layer of straw or hay placed on the netting. In dry districts it is often desirable to moisten the ground around the coop with water a few days before the eggs are due to hatch.

All broody hens should be taken off the nest daily for about 20 minutes after the first two or three days. During this period the hen relieves herself, feeds, and drinks. Grain feeding, particularly with whole maize, is satisfactory for broody hens. The eggs should be checked over seven to 10 days after being set and all infertile ones removed.

When only comparatively small numbers of ducks are set under hens the eggs may be tested at night with a good hand electric torch. Infertile eggs will appear quite clear at seven to 10 days and fertile eggs will have blood vessels developed around the dark spot or developing embryo.

Careful observation is necessary throughout hatching to detect eggs in which the germs have died and the contents are going bad. Bad eggs are not uncommon among duck eggs during hatching, and if they burst, all the other eggs may be badly soiled and the broody hen may desert the nest.

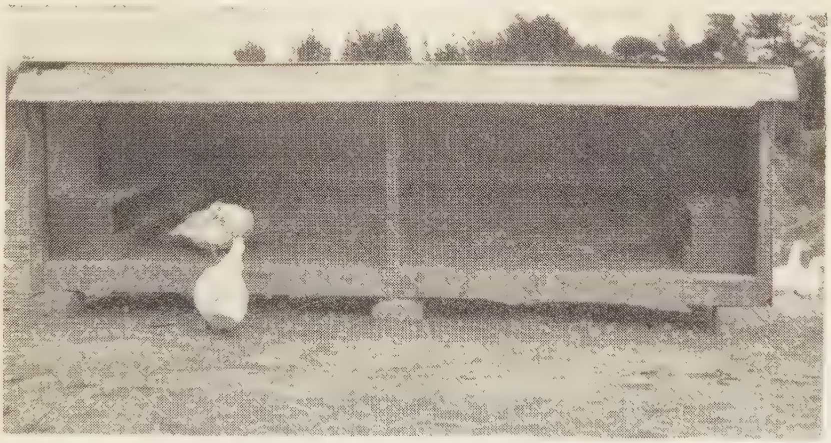
Bad eggs can usually be detected by discolouration of the shell, and if the eggs are held to the nose, a bad odour is noticeable. They can also be detected with an electric torch at night.

As soon as the ducklings have hatched, the egg shells should be removed and the hen and ducklings left until the latter are completely dry and rested after the effort of hatching.

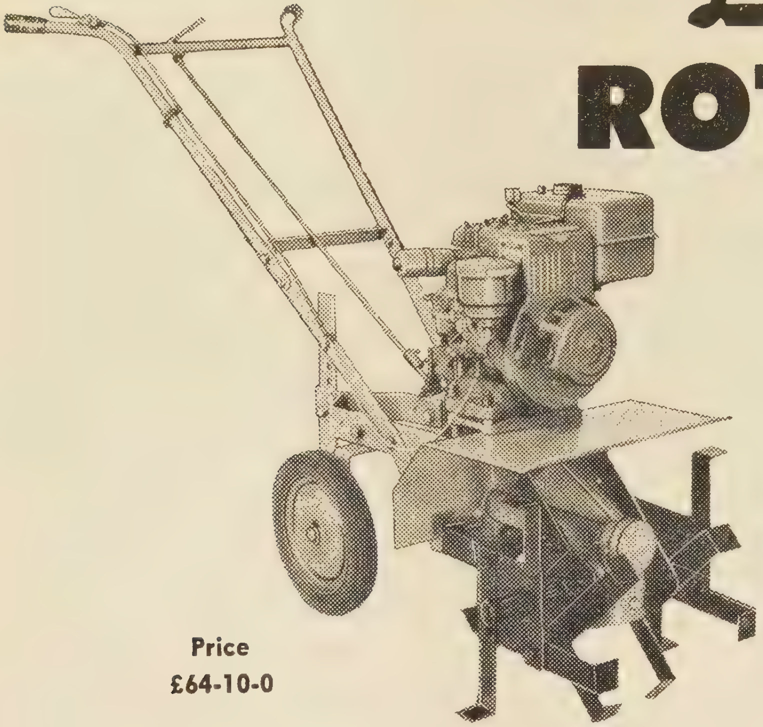
Incubator Methods

The hatching of duck eggs in flat-top or cabinet incubators is common today. The best method of operating an incubator for hatching duck eggs varies to some extent with the type of incubator, and experience with the machine will be necessary before the best results are obtained. For that reason there are marked divergences of opinion among those who have had experience of hatching duck eggs. However, the following points may act as a guide:

Flat-top machines are usually run at 103 degrees F, with a rise of up to one degree at hatching time. Duck eggs should not be heated too quickly and the doors may be left slightly ajar during the first six hours. No harm is done if 12 hours elapse after setting before the temperature reaches 101 degrees, and a further two or three days before the limit of 103 degrees is reached. The first 10 days are the critical ones, during which the eggs should be disturbed as little as possible—in fact, it is customary in the United States not to turn the eggs at all until the first test is made at the end of a week, and this method is also adopted by some duck farmers in New Zealand. Duck eggs may be tested for fertility seven to 10 days



A laying shelter used for Muscovy ducks.



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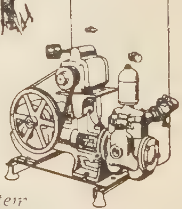

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after setting. A daily watch must be kept for eggs going bad; they may be detected readily by smell in the early stages of decay.

Opinions vary on the cooling of duck eggs, but it is suggested that cooling after the first week has advantages for eggs hatched in flat-top machines. Apart from any direct effect that the cooling may have on the embryos, this practice undoubtedly helps in the efficient ventilation of flat-top machines and increases the oxygen supply to the eggs. This recommendation applies more particularly during warm weather. These remarks do not apply to eggs hatched in cabinet machines.

Experiments before the war indicated that for duck eggs in an incubator a high humidity—say 70 per cent—is desirable during the first week with a subsequent reduction of about 5 per cent a week until hatching time, when the maximum moisture is required.

Similar treatment of duck eggs is required in a cabinet machine, except that the temperature is maintained at 100 degrees F. Special trays are required to pack duck eggs because they are bigger than hen eggs.

Rearing Ducklings

Given reasonable care, ducklings are easier to rear than chickens. They require a shorter brooding period during which warmth is necessary and are far less liable to disease. Against that must be set the increased difficulties of keeping conditions clean with ordinary brooding equipment. The usual types of litter such as straw, chaff, and rice husks rapidly become damp, soiled with droppings, and trampled into a messy condition.

If only a limited number of ducklings is to be reared, natural methods can be employed with excellent results. Some form of coop is required for the hen and ducklings for the first few days and for protection at night throughout the brooding period where rats are likely to cause trouble. Rats and weasels are particularly deadly to young ducklings and protection against them must be provided. If there is a hedge, shrubs, or some other protection to which the hen may take her ducklings during the day to avoid rain, hot sun, or cold wind, protection such as is given by coops is unnecessary during the day. After two or three weeks the ducklings may be taken from the hen and kept in a pen with a simple open-fronted shelter for protection at night and when necessary during the day. A heavy-breed hen will brood 15 ducklings comfortably.

Ducks may be reared artificially with almost any of the ordinary types of brooders. The number of ducklings placed under a brooder should be between 60 to 70 per cent of its actual chick capacity, which is not necessarily the chick capacity claimed by the manufacturers. It is now becoming common to rear ducklings in battery brooders, where they are maintained for two to three weeks. Battery brooders are favoured for their wire floors, which enable conditions to be kept cleaner and more hygienic than with floor brooding. In floor brooding it is desirable to make wire frames for under the hovers to overcome the dirty conditions that ducklings create.

Ducklings should be started at a temperature of 90 degrees F under the brooders, as with chickens, but the temperature may be dropped more quickly. In warm climates artificial heat may be dispensed with after about a fortnight. Ducklings may be allowed only a very limited range from the hover during the first two or three days; brooder surrounds of wood or metal should be used to confine them to this space. As ducklings produce liquid droppings and grow very rapidly, efficient ventilation in the brooder house or shed and under the canopy of the brooder is essential.

Ducklings may be allowed outside the brooder house pen after two or three days. If grass runs are provided, the grass should be kept short. Wet long grass is not suitable for young ducklings, as such conditions lead to chills. A modern method of running them is to provide a shallow cage outside the brooder house pen raised off the ground and having a fine-mesh wire netting bottom or slatted wooden floor. The ducklings go out into the extensions or cages for food and water and benefit from direct sunshine. With this type of floor the cages remain reasonably clean during the short brooding period.

Though heat from a brooder may be dispensed with when the ducklings are a fortnight old, the ducklings should be given the full protection of a brooder house until they are about four to five weeks of age, depending on locality and time of year. Thereafter they may be penned up in a grass run with some ground shelter from draughts or a simple wooden shelter in colder districts.

Plenty of Water Required

It must be emphasised that ducklings require plenty of fresh drinking water to be constantly available. Generally, it is ensured that the depth of the drinking water is sufficient to permit the ducklings to immerse their heads completely, so that their beaks and nostrils are kept clear of food accumulations and their eyes of sores. The writer was surprised on one occasion to see young ducklings provided with a drip-feed drinker and to note that there was no trouble from dirty beaks or sore eyes.

Any simple system of penning on grass attached to a low, open-fronted shelter will suffice for the growing period. It is important to note that ducks are inclined to be nervous and are easily frightened, particularly by dogs, cats, or rats. For that reason it is desirable to run growing ducks in comparatively small units—30 to 40 birds. Less damage is then done if the birds are frightened, as in big flocks they are likely to pile up on one another if frightened, causing damage. This point has to be watched when ducks are caught in a pen.

No endeavour is made here to go into the finer details of rearing. Such details are available in the Department's Bulletin No. 199, "Chick Rearing", which should be read in conjunction with this article. The methods there described are suitable also for ducks.

Feeding

In many respects ducks are fed similarly to poultry. The foods given and the methods of feeding vary according to age and the purpose for which the ducks are kept.

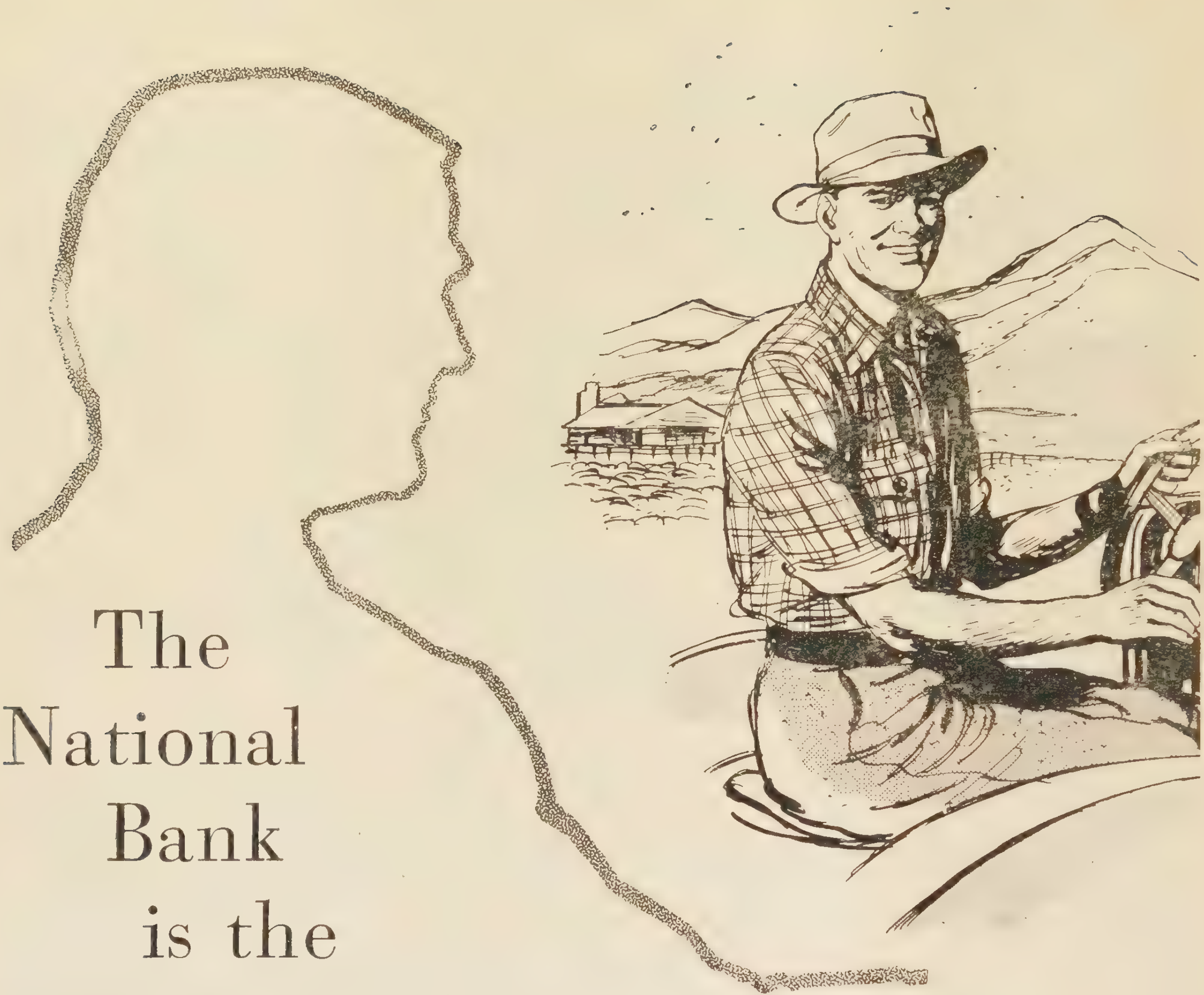
Method of Feeding Ducklings

Ducklings from a day old are fed on moist mash, carefully made into a palatable, crumbly condition. Care should be taken to avoid feeding a sloppy, wet mash, though after the first 10 to 14 days it is desirable to increase the amount of water added when mixing the mash. This mash is fed in small quantities, such as will be cleaned up readily by the ducklings in 10 to 15 minutes.

During the first 10 days ducklings should be fed five times daily, the meals being distributed as evenly as practicable over the hours of daylight. Thereafter, and until the ducklings are five weeks of age, four feeds of wet mash daily are recommended. From six weeks onward three meals daily are sufficient.

The mash may be given in troughs or on feeding boards, but whatever the utensils used ample feeding space is essential. It is undesirable that ducklings should scramble in competition with each other to obtain adequate food, as such scrambling may cause leg injuries and lameness.

The depth of food in a trough or on a board is of some importance. Ducklings readily paddle down any food given to them, and if food is given in



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quantity in a deep trough, some of it may be left in a solid, trampled mass at the bottom. These conditions do not apply to ducklings raised in a battery, where the birds feed from troughs through a wire grid.

Rations for Ducklings

Ducklings grow very rapidly and consequently food consumption is high, particularly when compared with that of chickens. Ducklings require mash which is similar in composition to chicken mashes. These mashes should contain about 18 per cent protein and 55 to 56 per cent carbohydrates. The fibre content should be low, about 4 to 5 per cent.

In New Zealand, where pollard and bran are not generally available on a free market and manufactured proprietary mashes are used, it is recommended that No. 1 chicken mash or any reliable chicken starter mash be used for feeding to ducklings. Such mashes usually contain 10 per cent of meat meal, varying in protein content from 45 to 55 per cent. Accordingly these mashes will be improved by the addition of 5 lb of dried skim milk or dried buttermilk powder, thus raising the total protein content of the mash to about 18 per cent.

Ducklings, like chickens, require an adequate supply of vitamins, and to ensure that vitamins A and D are available it is desirable to add a feeding fish oil or a synthetic vitamin product to the mash at the same rate as recommended for chickens by the manufacturers. The addition of vitamins A and D is necessary while the ducklings are kept in a brooder house, but once the birds are outside on grass runs and exposed daily to ample sunlight this is unnecessary. Apart from the addition of a vitamin-rich product, which can be discontinued at the growing stage, the mash fed to growing ducks can be similar to that fed during the first five weeks, but the amount of protein-rich foods should be reduced to about half. It will be noted that no mention has been made of feeding grain. It is not usual to feed grain with mash during brooding, but this may be started during the growing stages.

The following table shows a comparison in food consumption between ducklings and chickens of similar adult body weight.

POUND OF FOOD PER 100 BIRDS

	Ducklings		Chickens	
Weeks of age	Food consumed to date	Body weight	Food consumed to date	Average body weight (pullets)
1	24.5		14.2	
2	68.7	5.6 oz	38.2	2.8 oz
3	134.5		65.9	
4	256.7	1 lb 2 oz	110.0	6.8 oz
5	400.6		173.5	
6	547.3	1 lb 15 oz	250.7	13.2 oz
7	702.1		335.9	
8	880.6	2 lb 7 oz	424.8	1 lb 4 oz
9	1,079.1		504.2	
10	1,289.6	2 lb 12 oz	581.4	1 lb 9 oz
11	1,502.4		653.9	
12	1,703.7	2 lb 15 oz	719.9	2 lb 2 oz

This shows the high food consumption rate and the fast growth rate of ducklings. Thus at three months of age a Khaki Campbell duckling may be expected to have consumed 17 lb of food and to weigh about 3 lb. On the other hand a Barred Rock pullet will have consumed only 7 lb of food to get a weight of just over 2 lb. For the figures quoted it may be assumed that the duck and the pullet weighed about 4 to 4½ lb at maturity. Though these weights may be considered low, the figures of food consumption are valuable for comparison.

If it is intended to give ducks in lay a daily grain feed, it is wise to start this feeding gradually at three months of age. Ducklings may not take to grain readily if previously fed entirely on mash, so small quantities of grain are mixed in with the mash until the birds are well used to it. Thereafter grain should be given as a separate feed in place of one of the mash feeds.

During the earlier stages of the growing period three feeds daily are recommended, but they may be reduced to two as the birds approach laying.

When grain is fed, a mixture of three parts of wheat and one part of kibbled maize can be recommended. The grain mixture can be fed on short grass and hard ground, but otherwise it should be given in a trough with the grain just covered with water. Grain should not be fed in long grass or on soft ground, as some of it will be wasted. Ducks shovel up their food and cannot peck at grain like poultry.

Photographs by Sparrow.

Harvesting Red Clover Seed

RED clover seed is harvested either by direct heading or by cutting with the mower and leaving the material in the swath for a time to condition before threshing. On small areas and where the climate is not favourable, the crop may be stacked and threshed later.

The two types of red clover—cowgrass and Montgomery Red—require much the same treatment at harvest. For maximum yields and best quality seed the crop should be cut before the latest flowering heads have ripened. Under good drying conditions threshing is carried out with the header harvester 10 to 14 days after cutting or more under less favourable weather. Large areas are usually direct headed, when the crop must be left until dead ripe. This frequently means waiting for frosts to cut back the leaf growth, though spraying the crop with a leaf defoliant or crop desiccant will produce the same result and make the material ready for direct heading within a few days. Desiccants are particularly valuable for use on red clover seed crops in wet seasons when normal ripening does not occur.

Strong though the desire to get the seed into the bag may be, it is very wise to confine threshing to periods when the crop is really "fit". The use of correct header settings and restricting threshing operations to periods when the crop is fit will result in increased yields and less damage to the seed. If there is much crop debris after threshing, it should be removed from the paddock, as it encourages infestation by grass grub and porina.

—*J. P. BEGGS,*

Farm Advisory Officer,
Department of Agriculture,
Blenheim

"Proceedings of the Ruakura Farmers' Conference Week"

A wealth of scientific, technical, and practical farming information is contained in the 1959 issue of the "Proceedings of the Ruakura Farmers' Conference Week" now available at 10s. a copy post free from Publications Section, Department of Agriculture, Box 2298, Wellington, or the Ruakura Animal Research Station, Private Bag, Hamilton.

Divided into sections on sheep farming, dairy farming, and general farming, the publication, of over 200 well illustrated pages, is a ready reference. All conference papers and summaries of discussion on them are included.

Papers on research work in animal husbandry at the Station deal with everyday problems of farming in New Zealand and other authoritative papers on many aspects of farming are contained in the conference programme.

Correspondence Courses in Agriculture

CORRESPONDENCE courses in agricultural subjects are provided by the two correspondence schools of the Department of Education in Wellington for students in any part of New Zealand who cannot attend day or evening classes in their locality. These schools are the Correspondence School and the Technical Correspondence School.

THE **Correspondence School** provides post-primary courses in agriculture up to School Certificate standard for both full-time and part-time pupils. Applicants for courses who have had no agricultural experience or have not previously studied agricultural subjects should apply for one of the introductory courses listed as available from the Correspondence School. Further information may be obtained from the Headmaster, Correspondence School, Clifton Terrace, Wellington.

The Technical Correspondence School provides courses of a practical and applied nature for part-time students engaged in agricultural or horticultural work. Details may be obtained from the Principal, Technical Correspondence School, Buckle Street, Wellington.

Free post-primary education for five years or until the end of the year in which he or she reaches the age of 19 (whichever is the longer) is granted to every person in New Zealand. Applicants for correspondence courses who have not completed a five-year period of free post-primary education are therefore entitled to receive their courses free until they have completed that period. Students who already have had five years' free post-primary education have to pay fees for courses at both correspondence schools, but these fees are low and text-books may be hired.

Correspondence School Courses

Farm Practice

A one-year course dealing briefly with the more important branches of New Zealand's agriculture. This course is used as an introduction to the agricultural subjects of School Certificate, but it is also suitable for general study by pupils and adults interested in farming in New Zealand.

School Certificate Subjects

General agriculture. A two-year course covering how a plant grows, seed certification; soils, fertilisers, and manures; crops and pastures; the main types of plant and animal life of interest to the farmer.

Animal husbandry. A two-year course covering the cow, pig, horse, and sheep; principal breeds; current economic problems in stock farming; wool; pastures and their management; supplementary crops; genetics; physiology and diseases.

Dairying. A two-year course covering milk, cream, butter, and cheese; their production and distribution; herd testing and improvement; care and management of cattle; use of dairy products.

Biology. A two-year course covering the form and function of plants and animals in relation to their environments.

Horticulture. A two-year course covering plant form, function, and growth in relation to gardening matters.

The School Certificate subjects may also be taken for general knowledge by non-examination pupils. Any number of the above courses can be studied at the same time and provision is made for both written and practical work.

Subjects for Junior Examination of National Diploma of Horticulture

- Chemistry.
- Bookkeeping.

Technical Correspondence School Courses

Agriculture

Dairy Farming

The course gives a knowledge of the breeding, rearing, and general management of dairy stock under the grassland system of farming practised in New Zealand.

Consideration is given to soil and fertilisers, pasture management, farm layout, shed construction, sharemilking, valuing and purchasing farms, pig husbandry, and farm engineering.

Sheep Farming

The course covers principles of breeding, growth and development, nutrition, pasture management, wool, wool types, factors affecting wool production, preparation of the wool clip, and farm engineering.

Arable Farming

The course deals with the general characteristics of arable farming, crops and cropping, stock policy, management of pastures and equipment, budgeting, and the yearly cycle of operations.

Horticulture

Courses for the Junior, Intermediate, and National Diploma Examinations of the Royal New Zealand Institute of Horticulture

- Horticultural botany.
- Principles of botanical classification.
- Plant protection (stage 1 and 2).
- Horticulture (stage 1 and 2).

Certificate in Vegetable Culture

Course for those engaged in market vegetable production.

Courses for Horticultural Apprentices

- General horticulture.
- Horticultural botany.

Dairy Manufacture

The purpose of the courses in dairy manufacture is to offer workers in the dairy industry theoretical instruction in butter and cheese manufacture and to provide the necessary tuition for those who wish to enter as candidates for the Dairy Factory Managers' Registration Board examination.

The courses give instruction in the following subjects:

- Buttermaking.
- Cheesemaking.
- Dairy factory management.

Rural Valuation

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New Superintendent of Grading

MR N. E. BRIGGS, Dairy Instructor and Grader at Palmerston North, has been appointed Superintendent of Grading in the Dairy Division of the Department of Agriculture.

Mr Briggs joined the Department in 1948 as Dairy Instructor and Grader at Wellington. He was transferred to Hamilton in 1952 and Palmerston North in 1953. Before joining the Department of Agriculture he had had 19 years' experience in cheese, butter, and casein factories, including 10 years as a factory manager.

Mr Briggs.

Two years ago Mr Briggs visited the United States to study new processes and techniques in the use of dairy by-products.

As Superintendent of Grading Mr Briggs has the responsibility of ensuring that the grading of dairy produce for export is maintained at a uniform standard at the various ports.

Complimentary Tickets to English Royal Show

New Zealand farmers and their wives or those connected with agricultural research, advisory work, or education can obtain complimentary tickets to the English Royal Show to be held at Cambridge from 5 to 8 July 1960. Applications, giving some details of the applicant's association with agriculture, the days on which he wishes to attend, and his British address, should be made immediately to: The Secretary, Royal Agricultural Society of England, 35 Belgrave Square, London, SW1.

Daffodils in the Flower Garden

By J. P. SALINGER,
Horticultural Advisory Officer
(Ornamentals),
Department of Agriculture,
Wellington

Daffodils naturalised under a deciduous tree. They are less satisfactory under heavy shade such as pines or native bush.

DAFFODILS and narcissi, the typical harbingers of spring, provide brightness in the garden and in the home from May until September. They will grow and flower in all parts of the country.

THE average gardener divides them into three types:

"Jonquils", early flowering, producing flowers from May until August;

Daffodils with large trumpets, flowering in September;

Narcissi, all other types, flowering from mid July until October.

The varieties known as "jonquils" in New Zealand, for example Paper White, Creams, Soleil d'Or, and Earlicheer, are derived from *Narcissus tazetta* and not *N. jonquilla*. Specialists have of course divided these into specific types and these will be described.

Botany of Narcissi

Narcissi are bulbous plants and have narrow strap-like leaves and one or more flowers on a single stalk. The bulb is formed of three main parts: at the base a round, hard basal plate, brown, dry, scale leaves attached to the edge of the plate, and the fleshy white scale leaves attached in rings to the plate.

If the bulb is cut in halves vertically, the young flower bud will be seen in the centre of the scale leaves. Roots grow out from the area between the basal plate and the white scale leaves. The latter are the bases of the green leaves which grow above the ground and contain stored food, and once the flower bud is fully formed within the bulb it grows out through the ring of leaves.

The bulb is a living plant, and so even when out of the ground it must be treated carefully and not damaged or stored under unsuitable conditions.

At the same time as a narcissus is flowering the leaves are manufacturing food which passes down to the developing bulb, and the buds for the next season's flowering are gradually being formed at the base of these leaves. By the time the leaves have dried off the flower bud in the bulb has almost completed its development. Especially with jonquils the period of apparent dormancy is very short. The leaves stay green until November at least and the roots do not die off until December. By February new roots are being produced and the new season's leaves start to emerge from the bulbs in March. With jonquils the bulbs should not be out of the ground for more than two months, if possible.

The leaves should not be cut off before they die down naturally, as both during and after flowering they are feeding the bulb for the following year's growth and flowering.

The flowers of all narcissi have the same basic features:

1. A single main flower stem.
2. Toward the top of the stem a dry papery leaf called a bract.
3. A short stem known as the neck (actually the ovary).
4. The flower itself.

The flower consists of an outer ring of "petals", technically called the perianth, the cup or trumpet, technically the corona, and within the cup the reproductive organs of stamens and pistil.

Probably the main difference between daffodils and narcissi to the gardener is that the daffodil has a large cup, usually called a trumpet, and the narcissus a smaller cup.

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(Contour cultivation across the slope)

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Horticultural Classification

Owing to the wide variety of shapes and sizes of narcissi they have been separated into 11 divisions. The main features of this classification are:

1. Whether or not the flowers or plants are similar to certain narcissus species.
2. The difference in length between the cup and the perianth.
3. The difference in colour between the cup and perianth.

In flower shows there are often further subdivisions, depending on whether or not the cup is pink or red. The accepted classification is given in the table on page 197.

Use in the Garden

Narcissi have four main uses in the garden: They can be planted in irregular groups in mixed flower borders; they can be used for spring bedding; they are most effective when naturalised in grass, and the dwarf types are excellent for rock gardens.

As mixed flower borders are often bare of flowers and foliage in mid winter and early spring, they are excellent for daffodils and narcissi. Because the bulbs will be left in the same place for several years and the leaves persist well after flowering, the bulbs should be planted fairly deeply and preferably in the middle or back of the border so that the leaves will be hidden by other plants later in the season.

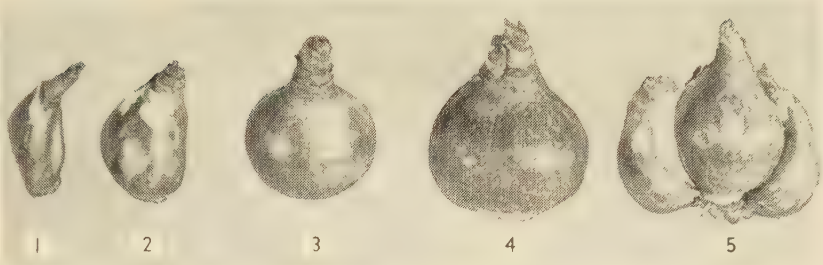
They are most effective when planted in groups, the varieties being kept separate as far as possible. They can be grown especially among deciduous flowering shrubs or under deciduous ornamental trees, but should not be planted among shrubs such as rhododendrons and camellias which resent root disturbance, as it will be necessary over a period of years to lift the bulbs, divide them, and replant.

A formal bed of one or two varieties can make an excellent display in spring, the bulbs being planted about 8 in. apart. Dwarf early flowering bedding plants such as double daisy, forget-me-nots, or polyanthus may be planted among them. The narcissi will need to be lifted as soon after flowering as possible and replanted in a shady reserve area so that they continue growing and build up the bulbs for the following year.

The little hoop-petticoat narcissus (*N. bulbicodium*) can be used as an edging to beds or borders and may be left in the same position for several years, as the foliage is never particularly obvious. It can also be combined with other similar bulbs such as grape hyacinths.

Naturalising Bulbs

Many varieties grow quite well when planted permanently in grass. They should not be grown on a close mown lawn but where the grass is cut less frequently as on banks and slopes. It is necessary to allow the grass to grow until about September before cutting it; then it may be cut in the areas between the groups of bulbs, and finally the whole area may be cut in early November. Bulbs can also be planted in open woodland areas, especially under deciduous trees, but they are not suitable for planting in areas of native bush or under dense shade such as pine trees.



Narcissus bulbs in five grades. 1—Small offsets. 2—Large offset, which may produce a flower. 3—Single round, which produces the finest flower. 4—Double nosed, which produces one or more flowers. 5—Mother bulb, producing poorer flowers.

The "jonquil" type such as Paper White and Soleil d'Or can be planted a few inches away from the base of a hedge, especially on the north side.

Rock Gardens

Many of the dwarf narcissus species or garden hybrids of that type are excellent for growing in pockets in a rock garden or similar miniature garden.

Bulbs in the House

In the colder areas narcissi and daffodils are sometimes grown and flowered in pots and bowls in the house, the bulbs being planted at the normal time in bowls of bulb fibre. They are placed in a cool dark place for six to eight weeks and when the leaves have emerged about 1½ to 2 in. out of the neck of the bulb they can be brought into a cool sunny room in the house. As the buds open they can be brought into a warmer room such as the living room. It will probably be necessary to support the leaves and this can be done by inserting thin wire or bamboo sticks near the bulbs and tying the leaves with green twine or wool.

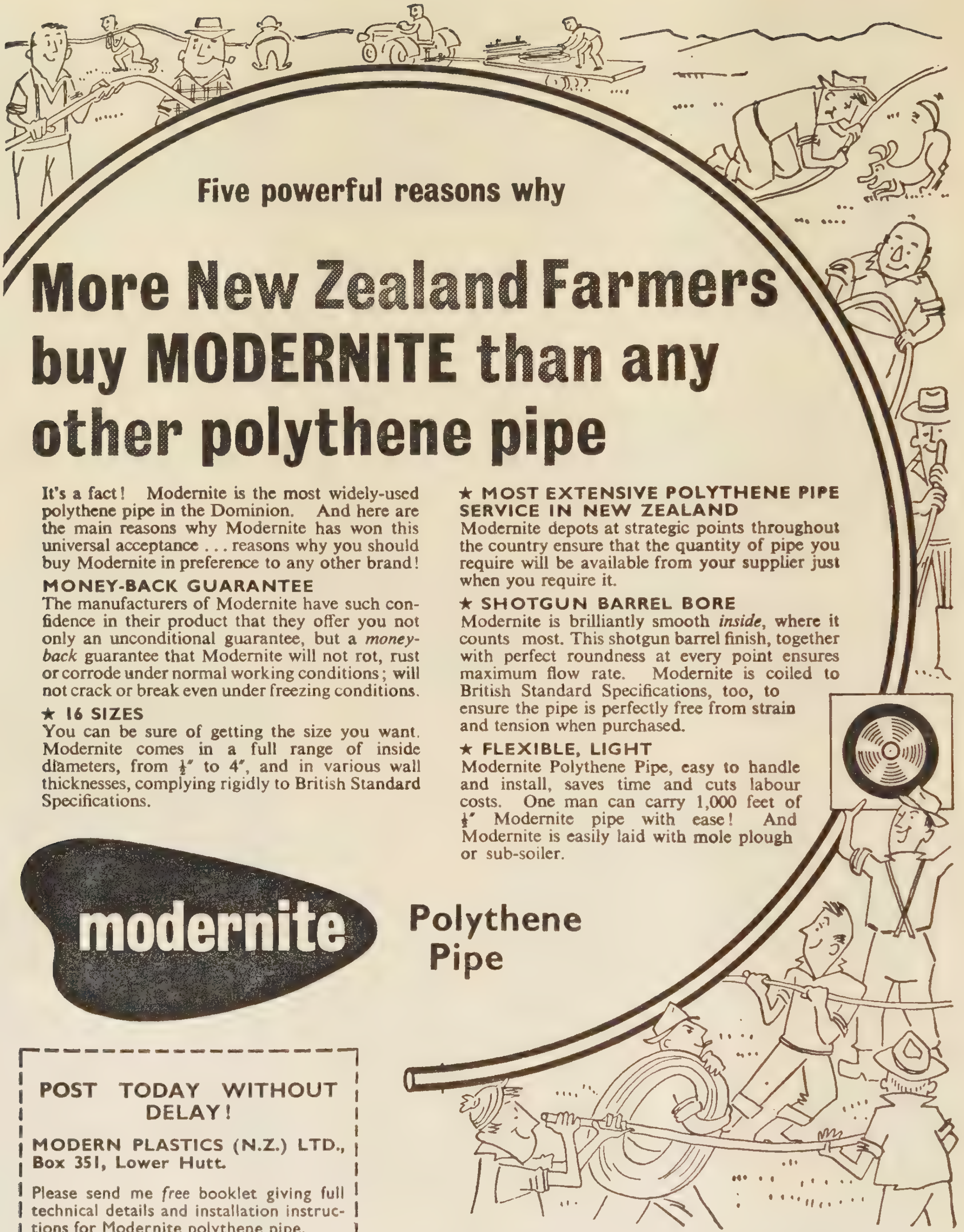
As bowls normally have no drainage, care should be taken with watering to ensure that the bulb fibre is moist but never has excess water.

Culture of Narcissi

Narcissi will grow in all types of soil provided it does not become waterlogged. The soil should be deeply cultivated but no additional organic matter needs to be added. Before planting, a fertiliser dressing of 4 parts of bone meal and 1 part of sulphate of potash should be mixed with the soil at 4 oz to the square yard.

Before planting, the bulbs should be dipped in an insecticide (containing aldrin) to prevent attack by narcissus fly, and dusted with a fungicide such

The hoop petticoat narcissus →
(*Narcissus bulbicodium*) flowers very freely in spring. [Elliott



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as thiram or captan to control fungous diseases present in the air or in the soil. If the aldrin dip is not used, the bulbs may be soaked in a mercury-based fungicide.

Bulbs should be planted from the end of February until the middle of April, the top of the bulb being covered with 4 in. or more of soil. They are normally spaced 4 to 8 in. apart, the larger bulbs being spaced more widely.

After planting, the area should be labelled so that the emerging plants are not damaged by cultivation later. Apart from weeding, the plants should require no further attention until they have flowered. As the flowers fade they should be picked just below the swelling seed pod near the bract and the flower stem and leaves left at their full length.

If the ground is required for other purposes, the bulbs should be lifted carefully at this time, as many roots as possible being retained, and replanted immediately in another area to complete their growth. Narcissi are mostly left in the same position for several years and the foliage becomes untidy and may be damaged at this time. It can be folded over and held in place with rubber bands or green wool, which gives a neat appearance and prevents leaf damage. This is somewhat easier than tying the leaves in a knot.

At this time the surface of the soil should be dusted with DDT or lindane dust and the treated soil drawn to the bases of the leaves to prevent and control egg laying by narcissus bulb fly.

By the middle of November foliage will have yellowed or browned and dried off and can be removed and the surface soil lightly worked to fill in the holes left by the leaves.

Bulbs should be lifted from early December until the middle of January, the jonquil types being lifted first. A satisfactory method of lifting is to shovel the soil away from about 2 in. above the bulbs and then to take a fork and dig down vertically round the outside of the clump. The whole can then be lifted out and the bulbs separated. The soil should be rubbed off the bulbs, which are then placed in shallow trays to dry off in an airy place protected from direct sun. They should not be left lying on the ground exposed to the sun. After a few days the bulbs can be completely cleaned, the broken outer scale leaves removed, and the dried roots rubbed off.

The bulbs should be carefully examined. Those which feel soft are probably infected by narcissus fly or eelworm and should be destroyed unless the bulbs are valuable. At the same time bulbs can be separated for replanting. The largest, known as mother bulbs, consist of a large centre bulb flattened on two sides, with one or more semicircular bulbs on either side. The side bulbs may be removed and can be graded into two sizes: smaller ones, which are unlikely to flower the following season, and larger ones, which will produce one flower. These offsets grow into typical round bulbs the following season. The round bulbs produce the finest flowers.

The popular Soleil d'Or narcissi produce the earliest scented flowers.

At this stage the hot water treatment would need to be given to control eelworm (see this section under "Pests" on page 197). After the bulbs are sorted they should be returned to store until they are replanted in autumn.

PESTS AND DISEASES

Narcissi of all types are subject to various pests and diseases which must be controlled if a healthy stock is to be retained.

With infected bulbs the leaves and flowers will appear unhealthy, and any

Narcissus bulbs after they have flowered can be lifted and heeled in in an inconspicuous place until the tops die down. The beds can then be replanted.

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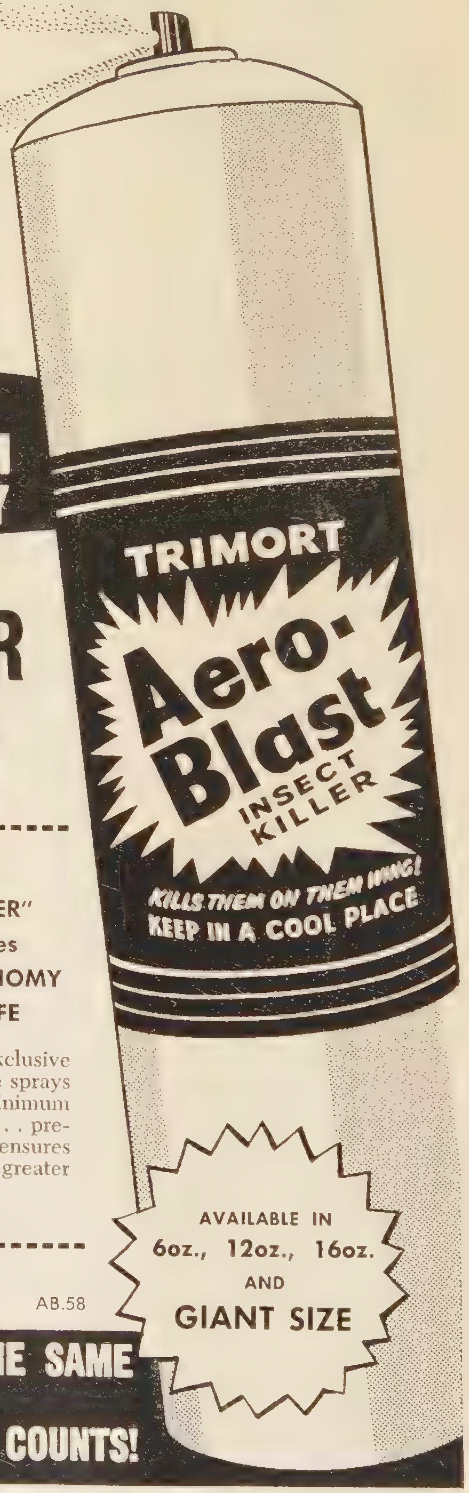
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Horticultural Classification of Narcissus

Division 1—Trumpet Narcissi of Garden Origin

	Typical variety
Distinguishing characters: One flower to a stem; trumpet or corona as long or longer than the perianth segments	
(a) Perianth coloured; corona coloured, not paler than the perianth	King Alfred
(b) Perianth white; corona coloured	Queen of Bicolors
(c) Perianth white; corona white, not paler than perianth	Mount Hood
(d) Any colour combination not falling into (a), (b), or (c)	

Division 2—Large-cupped Narcissi of Garden Origin

	Typical variety
Distinguishing characters: One flower to a stem; cup or corona more than one-third, but less than equal to the length of the perianth segments	
(a) Perianth coloured; corona coloured, not paler than the perianth	Fortune, Carlton
(b) Perianth white; corona coloured	John Evelyn
(c) Perianth white; corona white, not paler than the perianth	Candour
(d) Any colour combination not falling into (a), (b), or (c)	

Division 3—Small-cupped Narcissi of Garden Origin

	Typical variety
Distinguishing characters: One flower to a stem; cup or corona not more than one-third the length of the perianth segments	
(a) Perianth coloured; corona coloured, not paler than the perianth	Market Merry
(b) Perianth white; corona coloured	La Riante
(c) Perianth white; corona white, not paler than the perianth	
(d) Any colour combination not falling into (a), (b), or (c)	

Division 4—Double Narcissi of Garden Origin

	Typical variety
Distinguishing character: Double flowers .	Texas, Cheerfulness

Division 5—Triandrus Narcissi of Garden Origin

	Typical variety
Distinguishing characters: Characteristics of *N. triandrus* clearly evident	
(a) Cup or corona not less than two-thirds the length of the perianth segments	Hawera
(b) Cup or corona less than two-thirds the length of the perianth segments	Silver Chimes

Division 6—Cyclamineus Narcissi of Garden Origin

	Typical variety
Distinguishing characters: Characteristics of *N. cyclamineus* clearly evident	
(a) Cup or corona not less than two-thirds the length of the perianth segments	
(b) Cup or corona less than two-thirds the length of the perianth segments	

Division 7—Jonquilla Narcissi of Garden Origin

	Typical variety
Distinguishing characters: Characteristics of any of the *N. jonquilla* group clearly evident	
(a) Cup or corona not less than two-thirds the length of the perianth segments	
(b) Cup or corona less than two-thirds the length of the perianth segments	Trevithian

Division 8—Tazetta Narcissi of Garden Origin

	Typical variety
Distinguishing characters: Characteristics of any of the *N. tazetta* group clearly evident	Geranium, Soleil d'Or

Division 9—Poeticus Narcissi of Garden Origin

	Typical variety
Distinguishing characters: Characteristics of any of the *N. poeticus* group without admixture of any other	Actaea

Division 10—Species and Wild Forms and Hybrids

	Typical variety
All species and wild, or reputedly wild, forms and hybrids	*N. bulbicodium*

Division 11—Miscellaneous Narcissi

	Typical variety
All narcissi not falling into any of the foregoing divisions	

distortion or poor growth of these parts should be considered as due to damaged bulbs. Nothing can be done to control these troubles when the plants are growing, but various preventive or control treatments can be applied to the dormant bulbs.

Pests

Stem and Bulb Eelworm

The minute organisms stem and bulb eelworm (*Ditylenchus dipsaci*) live within the bulb and feed on the scales; they can also live outside the bulb on various weeds.

When infested, the inner bulb scales become brown in concentric rings. If infection is suspected, the bulbs can be cut horizontally across the neck and the infected scales can be seen. If the bulbs are healthy, they can be replanted, having suffered no damage from this examination.

Infected bulbs produce distorted leaves which often emerge and grow in a curve; these leaves are less vigorous than healthy ones. In established plantings this is shown as increasing areas of weaker-growing bulbs.

Control

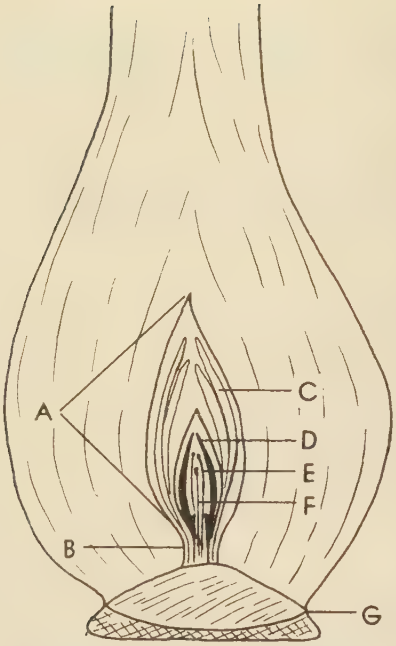
There is no chemical method of control and the bulbs must be given the hot water treatment. Dormant bulbs are placed in a tank of water heated to 112 degrees F and after the bulbs are immersed the temperature is retained accurately at 110 degrees F for three hours. A fungicide such as formalin used at ½ per cent (4 fl. oz. of commercial formaldehyde to 5 gallons of water) should be added to the water to prevent the spread of basal rot fungus.

Bulbs should be quite mature at lifting and should be stored at 70 degrees F for a fortnight before treatment.

With the special equipment and accurate temperature control required for the hot water treatment, this method is outside the scope of the average gardener, and if bulbs are

Key to Narcissus Pests and Diseases

Symptoms	Cause	Control
Bulb		
Bulb feels soft and spongy ..	1. Narcissus fly ..	Destroy soft bulbs Dip all remainder in aldrin bulb dip
	2. Eelworm	Give hot water treatment
Bulb is soft at basal plate ..	Basal rot fungus ..	Dip in fungicide after lifting; store correctly
When cut horizontally scales show brown rings	Eelworm	Destroy badly infected bulbs. Give remainder hot water treatment
When cut horizontally, scales show brown specks	Bulb mite	Give hot water treatment, if severely infected
Leaves		
Only one or two small leaves emerge	Narcissus fly or eelworm	See section above
A few leaves emerge and develop in a curve	Eelworm	See section above
Leaf tips and blades show brown scorched areas	Leaf scorch disease	Spray with bordeaux mixture
Leaves show pale yellow streaks and stripes	Virus diseases ..	Destroy infected plants
Flowers		
Flowers show pale areas	Virus diseases ..	Destroy infected plants
Flowers distorted after hot water treatment	Hot water treatment	Treatment applied too late or at too high a temperature. Bulbs will recover the following season



Narcissus bulb at suitable stage for hot water treatment. A—Bud in widest part of bulb. B—About ⅛ in. to ¼ in. of stalk. C—Foliage leaves. D—Perianth fully formed (including corona). E—Stamens fully formed. F—Pistil. G—No roots showing here. All the floral parts must be complete. Enough stem must be formed to place the bud clear of the basal plate, but the bud must not have moved up into the neck.

found to be infected with eelworm they should be discarded. The practice is however necessary with valuable stocks of narcissus.

After treatment the bulbs should be cooled quickly and stored in clean trays, stockings, or open-mesh sacks.

They should be replanted in clean ground.

Bulb Flies

Narcissi are attacked by two types of bulb fly, the narcissus bulb fly (*Lampetia equestris*) and the lesser bulb fly (*Eumerus tuberculatus*). The former lays eggs on the soil or at the bases of the leaves and usually a single maggot enters the bulb at the base and eats into the centre of the bulb, causing it to become brown and soft inside. The lesser bulb flies are smaller and several eggs are laid round the bases of the leaves, the maggots entering the bulb near the neck, so that more than one maggot is present in the bulb. This species also attacks a wide range of other bulbs.

Control: Severely infested bulbs should be burnt. Less severely affected bulbs can be given the hot water treatment for 1½ hours if eelworm is not present or fumigated with methyl bromide in a fumigation chamber.

Bulbs can be protected from infection by dipping them before planting in an insecticide dip based on aldrin. During the growing season, especially from August to November, the bases of the leaves should be dusted with lindane or DDT and the soil drawn up round them to inhibit egg laying by the flies.

Bulb Mite

Bulb mites (*Rhizoglyphus echinopus*) are small active insects which feed in the bulb scales and cause small brown areas to develop. These are not in concentric rings as with eelworm infection. The mites are usually considered to be secondary to other damage; and the origin of the damage should be sought. This could be caused by bruising the bulbs or by unsuitable storage.

Control: There is no simple chemical control. Infected bulbs can be given the hot water treatment. Slightly infected bulbs may be replanted in well drained soil without treatment and they will gradually become healthy.

Diseases

Basal Rot

A disease, basal rot (*Fusarium bulbigenum*), attacks the bulbs. Varieties vary in susceptibility, the early flowering Golden Spur being particularly susceptible. The disease can also be present in the soil. It causes a soft brown rot at the base of the bulb, and later a pink fungus develops.

Control: There is no direct chemical control. Infection can be reduced by lifting the bulbs at the correct time and storing them suitably. Before planting, the bulbs can be dipped in a mercury-based fungicidal dip or if dipped in aldrin can subsequently be dusted with captan or thiram before planting.

Leaf Scorch

The disease leaf scorch (*Stagonospora curtisi*) produces brown areas on the tips of the leaves after they emerge from the soil and brown streaks on the more mature leaves. It is more common after heavy rain, wind, or frost.

Control: It can be controlled by spraying the plants after emergence and after periods of bad weather with bordeaux mixture at 3 : 4 : 50 (4 oz of copper sulphate and 5 oz of hydrated lime to 4 gallons of water).

Virus Diseases

Narcissus mosaic or stripe is caused by a virus disease producing pale yellow stripes on the leaves and paler blotches on the perianths and cups of the flowers.

Frequently the whole stock of one variety may be affected. The disease can be transmitted by aphids, but as these are seldom found on narcissi, the commonest cause is probably multiplication of infected plants.

[*Shell*

Narcissus bulbs infected by lesser bulb fly maggots will feel soft when they are lifted. The soil should be drawn up round the base of the leaves to reduce the attack by these and the narcissus bulb fly.

The best control is to rogue out regularly all infected plants, even destroying a complete variety if it is totally infected.

Garden Work in March

Cassia "John Bull" is one of the most colourful autumn - flowering shrubs, carrying a dense mass of deep yellow buttercup blossoms for nearly two months and continuing to flower a little throughout the winter in milder districts. It is frost tender and somewhat difficult to transplant successfully.

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

Caryopteris mastacanthus and *C. clandonensis*, the "blue spiraeas", are small dainty shrubs with scented grey-green leaves. They are hardy and deciduous, but should be given a warm, sheltered position in the south.

Sternbergia, the autumn crocus, is hardy and easy to grow in any well drained soil. It has large, deep yellow, crocus-like flowers which last well when cut. Plant in January.

Another autumn crocus is Zephyranthes, some species of which are frost tender, while others (for example, *Z. candida*) are hardy. They are free flowering in sunny, well drained positions, some blooming from spring to autumn. Different species produce yellow, white, or pink flowers. A good pink variety is *Z. verecunda rosea.* Bulbs are semi-dormant from May until August, when they should be transplanted.

A visit to the many flower shows held this month is worth while if only to see the dahlias. New varieties being constantly introduced can be compared on the show bench and their type of growth and possibilities for garden decoration discussed with the local nurseryman.

Pests and Diseases

Thrips: These tiny pests, which can be seen on the backs of the leaves are likely to increase rapidly this month, particularly on fuchsias, acmena, and other shrubs and hedge plants. Typical symptoms are silvering and shedding of the leaves; bushes may be completely denuded.

Spray with DDT or lindane as soon as thrip damage is observed, and at fortnightly intervals during hot, dry weather at ½ oz of 50 per cent DDT wettable powder or 1 oz of lindane wettable powder in 4 gallons of water.

Red spider mite is another hot weather pest attacking the leaves of plants. The leaves turn a light brown and the minute reddish mites are just visible on the undersides of the leaves. Spray with a mixture of 6½ fl. oz. of summer oil and 4/5 fl. oz. of nicotine sulphate in 4 gallons of water or malathion at ½ fl. oz. of the emulsion.

Weevils are often present in large numbers. They cluster in the tips of shoots or in the axils of leaves of luculias and other shrubs and plants. They feed at night, making large semicircular holes in the edges of leaves. When such damage is observed spray affected plants with DDT or lindane as for thrips

Caterpillars and aphids are common now and should be controlled by spraying with lindane, as they can do permanent damage by crippling the young developing shoots of trees and shrubs.

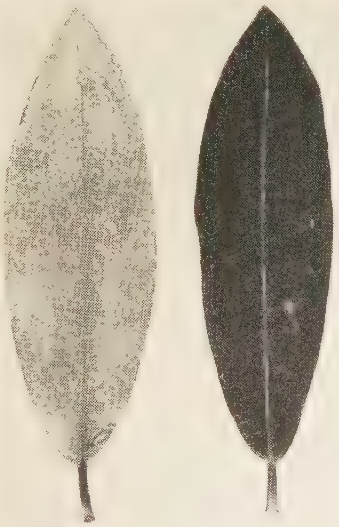
Glasshouse Work

Prepare the glasshouse for the receipt of winter-flowering plants. Before attempting to clean and disinfect the house remove all plants to a frame or sheltered position outdoors. Clean the glasshouse thoroughly by washing down the glass, woodwork, benches, etc., with a disinfectant such as 2 per cent formalin solution. Doors and ventilators should then be left open for about a week until all fumes are dispersed, as these are harmful to plants, causing scorching of the leaf edges and growing tips or death of the plant in severe cases. Any broken glass or sash cords, etc., should be repaired and heaters checked.

[*Shell*

Thrip damage to gladioli flowers.

In colder districts frost-tender plants which have been growing in bush houses during summer should now be transferred to the glasshouse or used as house plants.



Leaves of many shrubs become silvered by thrips as on left-hand leaf (normal leaf on right).

As the weather becomes colder, watering should be less frequent, and when necessary it should be done in the morning to allow any excess water to evaporate before nightfall. Water should be at the same temperature as the atmosphere in which the plants are growing. With the exception of cyclamen, chrysanthemum, and other winter-flowering plants, feeding should be discontinued, as most plants are growing more slowly at this time of the year. Continue disbudding chrysanthemums.

Summer-flowering bulbs and tubers such as amaryllis, gloxinia, achimenes, and tuberous begonias are gradually dried off by watering less frequently. When dry they can be stored by placing the pots on their sides or they can be shaken free of soil and dusted with thiram to control storage rots before being placed in a dry frost-free position for winter.

The majority of pot plants have no bulb or tuber but only a mass of fine hair-like (fibrous) roots which would die if deprived of water. Consequently, though much less water is required during winter, these plants should never be allowed to become completely dry, as that would kill them. Excessive watering is also undesirable, making the plants softer and more susceptible to frost damage and diseases.

Planting and Sowing

New lawns should be sown in firm, clean ground. A dressing of equal

FLOWER GARDEN . . .

parts of superphosphate and sulphate of ammonia at 1 oz to the square yard and DDT at ¼ oz of 40 per cent wettable powder to 10 sq. yd. raked in before sowing will encourage the growth of the grass seedlings and protect them from grass grub and other soil pests.

In most parts of the country fine grasses such as browntop and Chewings fescue are successful. In the Auckland Province a pure paspalum lawn is more effective, as this grass gradually invades most lawns. Paspalum should not be sown until spring, but the ground can well be cleaned and levelled now in preparation for sowing.

Bedding plants for a winter and early spring display should be planted now. In warmer areas *Primula malacoides*, stock, cineraria, and nemesia are most attractive. Recently, modern varieties have been raised, with larger flowers in a wider colour range, and these should be used wherever possible in place of the old, less showy types. Other reliable winter bedding plants are calendulas, Iceland poppies, anemones, wallflowers, polyanthus (Pacific hybrids), and hybrid primroses.

Complete the planting of spring-flowering bulbs, making mass bedding displays or groups in the herbaceous or shrub borders. If planted in the herbaceous border, groups should be placed behind clumps of later flowering plants which will grow up and hide the dying leaves of the bulbs.

Summer annuals should be cleared and composted as soon as their flowering is over. Sweet peas and other hardy annuals such as alyssum, candytuft, clarkia, and larkspur can be sown now for a late winter and early spring display, being sown on a prepared seedbed for transplanting later to their flowering quarters or direct where they are to flower.

Seeds of herbaceous perennials and biennials such as delphiniums, Canterbury bells, sweet william, gaillardia, and geums can be sown now in carefully prepared seedbeds in a well drained position in the open ground or in boxes in a cold frame. Germination is often better from newly harvested seed, and many of the resulting plants will flower the following season.

Preparation should include thorough cultivation to destroy as many weeds as possible and to produce a good tilth. A dusting of bone meal or superphosphate applied to the soil is beneficial, as it will encourage the formation of a good root system. Allow about two weeks for the soil to settle again before sowing, watering it if necessary. Sow thinly with the seed covered with little more than its own depth of soil. Many seedlings die before they reach the surface of the soil through being sown too deeply, particularly in heavy soils. If the seeds are very small and difficult to sow thinly, they can be mixed with fine dry sand or soil and the mixture scattered along the drill.

Carnation layers which were inserted last month may have developed sufficiently to be severed from the parent plant and transplanted. Those which have not produced much new growth at the tip or many new roots should remain attached to the parent until later in the month or until the following spring. Before moving rooted layers or cuttings into their flowering position they should be watered thoroughly at least for a few hours and preferably 24 hours previously to reduce the shock of transplanting, when some roots are inevitably broken and contact with the soil and water supply is temporarily lost. Plant firmly and water well in the new positions. If there is any delay in replanting, the rooted cuttings can be kept fresh by placing them in a polythene bag.

Citrus and evergreen shrubs which it is planned to move in the early spring should now be wrenched. Cut round the tree roots with a sharp spade about 12 to 18 in. from the centre so that all large roots are severed. The tree should then be firmed and watered. Wrenching is thus a method of root pruning, encouraging the growth of fibrous roots in a small ball of soil, making the tree easier to lift and move later. It should not be done during a hot, dry spell, but when the soil is thoroughly moist; otherwise it can cause a severe check to the plant.

Cuttings of geraniums, pelargoniums, violas, pansies, and pentstemons can be taken now and inserted in sandy soil in a frame or cold glasshouse.

Floral Decoration

Dahlias are plentiful in March. Surplus leaves should be removed and the basal inch of the stems placed in boiling water before they are arranged. Pompom and small decorative dahlias are easier to use for decorations than the larger types.

Flowers of many kinds can be dried, including statice and the various "everlasting" flowers, delphiniums and larkspur, yarrow (*Achillea* spp.) bird of paradise, coxcombs, golden rod, spiraea, sea holly, and *Salvia farinacea*. They should be cut at the perfect stage for fresh flower arrangements, all leaves stripped off, the flowers tied in small bunches, and hung upside down in a dark, airy shed. Darkness is essential if the colour is to be retained.

Beech leaves or similar foliage may also be preserved by standing in a mixture of 2 parts of water to 1 part of glycerine until the desired depth of bronze or copper develops in the leaves. After treatment, dried flowers and foliage may be rolled in newspaper or stored in a box or cupboard for use as required in either fresh or dried arrangements.

Book Reviews

"A Book of Ferns": Greta Stevenson

THE recent publication of a revised and enlarged second edition of "A Book of Ferns" by Greta Stevenson is a welcome addition to the books describing our New Zealand native plants. In the introduction the author states that the book "is intended for beginners, particularly children", but any lover of ferns will find it an inexpensive and valuable reference.

There are descriptions of over a hundred ferns, of which 76 of the more common species are illustrated by pen and ink sketches by the author. In addition there is information on the cultivation of ferns, their significance in Maori designs, the methods of fern reproduction, and the preparation of herbarium specimens. Maori and common names are given in the text, and a comprehensive glossary of Maori names is included with a short glossary of botanical terms. The inclusion, where possible, of the meanings of the Maori names and more information on the uses of our native ferns would have added to the interest of the book.

The author has taken great care in checking her descriptions with those of other more technical works in this field. Where names have changed, the former names are listed for each species and this will help to avoid the confusion which beginners usually experience with nomenclature.

For both beginner and enthusiast this book should prove a further stimulant to the collection and observation of New Zealand ferns.

—*L.H.McD.*

Paul's Book Arcade, Hamilton. 13s. 6d.

Garden Pests and Diseases, How to Control Them in New Zealand: G. G. Taylor

THIS is a small book, of which half is an outline of symptoms of pest and disease injury and general control measures and the other half describes how to identify and control specific pests and diseases of vegetable crops, fruit trees, and ornamentals.

It deals with these subjects briefly, but the essentials are presented with an appreciation of the needs of the home gardener. The result will be valued by any gardener who pauses to wonder "what has been at them" and offers sound advice on what can be done about it. —*M.M.B.*

A. H. and A. W. Reed. 4s. 6d.

Stone Fruits

THE season for fresh stone fruits is a relatively short one. Apricots, nectarines, and cherries are readily available for only about two months of the year; peaches and plums have a longer season. The following recipes have been selected because they give a variety of ways of using these fruits in puddings both hot and cold. In most cases fresh fruits can be replaced by bottled, tinned, or frozen fruits, and where fruit pulp is given in the recipe dried fruits may be substituted for the fresh.

By ELEANOR S. CAMPBELL,
formerly Home Science Instructor,
Department of Agriculture,
Auckland

Raw Fruits

STONE fruits are delicious when eaten raw. A pleasant and easy way of serving fresh plums, damsons, or nectarines is as follows:

Wash the fruits, split them neatly in halves, and remove the stones. Place in a glass dish, cut side up, and sprinkle lightly with sugar. Put in a refrigerator and leave overnight. This makes a delicious dish of cold juicy fruit and eliminates the tartness that often accompanies stewed plums.

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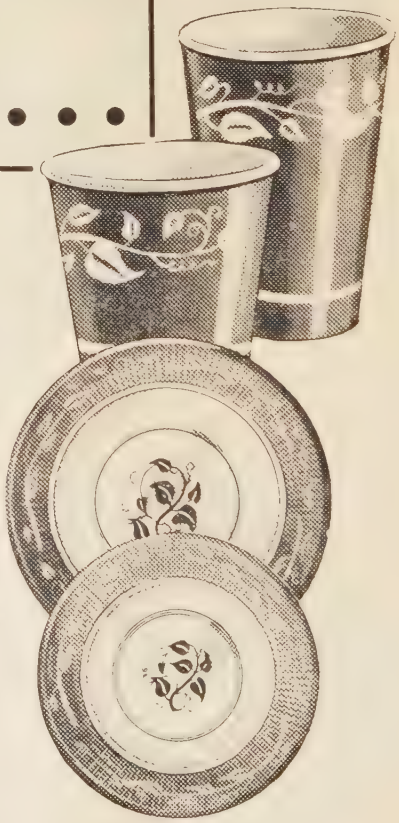


Skinning Ripe Peaches and Apricots

To skin ripe peaches and apricots dip the fruit for a few moments in a bowl of boiling water and then in cold water. The skins should then slip off easily.

Cold Fruit Puddings

Plum Shape

Large, fleshy plums or damsons are particularly suitable for this dish.

1 lb of plums
¾ pint of water
½ lb of sugar
1½ oz of gelatine
1 lemon

(Six servings)

Wash the plums. Grate the rind of the lemon and then squeeze and strain the juice. Put the water and sugar into a pot and bring to the boil. Add the plums and simmer until soft. Drain off the juice and put the fruit through a strainer. Measure the fruit juice, add the lemon juice, and make up to 1 pint with water. Heat the mixture. Dissolve the gelatine in a little cold water. Stir this into the fruit juice until it is dissolved. Put the fruit pulp in the base of a mould which has been rinsed in cold water, pour the fruit juice on top, mixing it in a little with the pulp. Leave in a refrigerator to set. Turn out when cold and serve with cream.

Apricot Cream

1 cup of apricot pulp (sieved)
Juice of 1 grapefruit
1 cup of cream (whipped)
4 oz of sugar
1 cup of apricot juice
¾ oz of gelatine

(Six servings)

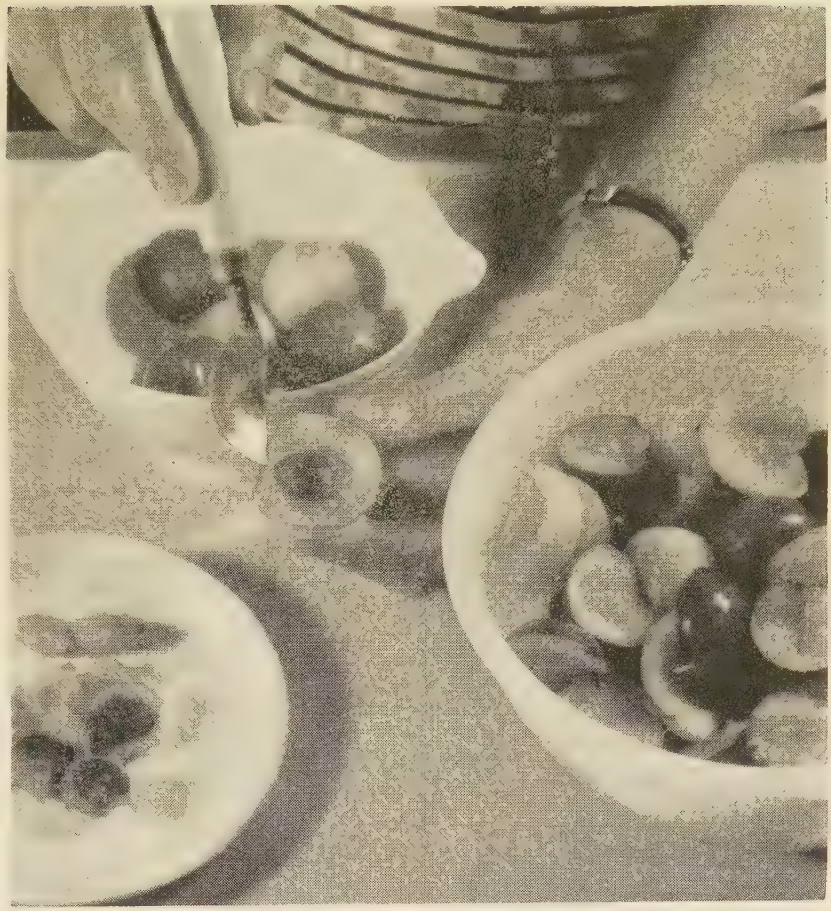
To make the pulp stew fresh apricots gently until soft. Strain off the juice and put the fruit through a sieve. (If dried apricots are used, they should be soaked in hot water for 24 hours before cooking. Tinned apricots need no further cooking; simply strain off the juice and sieve the fruit.) Add the sugar to the juice (decrease the quantity if tinned fruit is used). Heat the juice until the sugar is dissolved, soak the gelatine in a little cold water, add to the juice, and stir until dissolved. Take off the heat, add the grapefruit juice and apricot pulp, mix well, and leave in a bowl in a cold place until just setting. At this stage whip the cream, stir into the jelly, beat well together, then pour into a mould and leave to set.

Peche Melba

The following is a quick method of serving this delicious sweet at home.

Ice cream
Canned half peaches
Whipped cream
Strawberry jam

Cover the bases of individual glass dishes with flat slices of ice cream. Place half a peach on the centre of each slice of ice cream, pile whipped cream lightly around, and decorate with dabs of strawberry jam.



A handy gadget for removing stones from fruit.

Apricot Eggs

1 pint of milk
1½ oz of cornflour
Vanilla essence
2 tablespoons of sugar
6 halves of apricots

(Six servings)

Rinse six cups in cold water and place one half apricot round side down in the bottom of each cup. Mix the cornflour to a smooth paste with a little of the cold milk. Put the rest of the milk on to heat; add the sugar and a few drops of the essence. When the milk is at boiling point add the cornflour, stir well to eliminate all lumps, and cook gently for three to four minutes. Pour over the apricots in the cups. Leave in a cool place to set. When cold turn out carefully and serve.

Peach and Rice Ring

1 pint of milk
3 oz of white rice
2 eggs
2 oz of sugar
Whipped cream
3 medium fresh peaches or 6 halves of canned peaches
Pinch of salt
Ground nutmeg

(Six servings)

Wash the rice and place it in the top of a double boiler with milk, sugar, and salt. Bring to the boil, stirring frequently. Then place over boiling water in a double saucepan and cook gently until the rice has absorbed the milk. The mixture should be thick and creamy but not stodgy. Beat the eggs and stir these into the rice mixture. Cook for another five minutes. Turn the rice out into a greased ring mould and leave until quite cold.

If fresh peaches are used, skin them, halve carefully, and remove the stones. Simmer gently in a little water, with added sugar to taste, until tender but still firm in shape. Strain off the juice and thicken this slightly by using 1 teaspoon of cornflour per ½ pint of juice. When ready to serve turn the ring mould of rice out on to a dish, sprinkle with ground nutmeg, and carefully place the peach halves around the top. Whipped cream may be used to decorate and the thickened juice served as a sauce.

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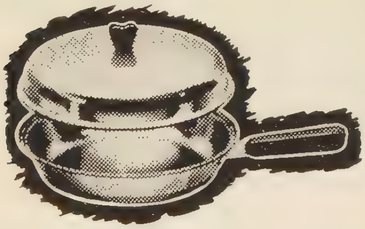

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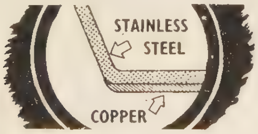

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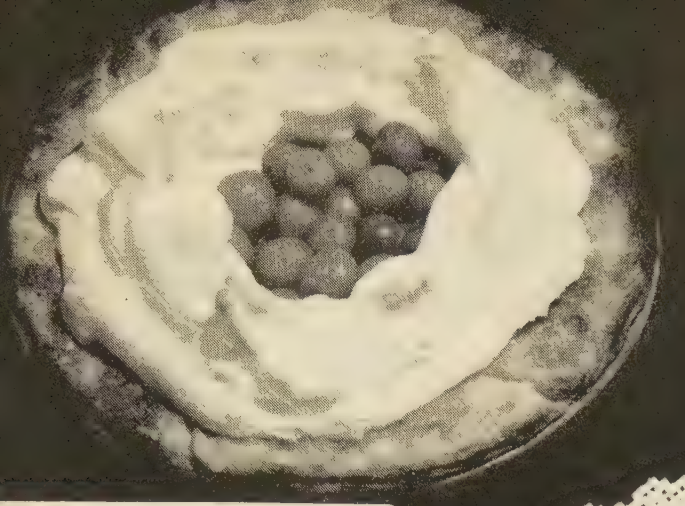
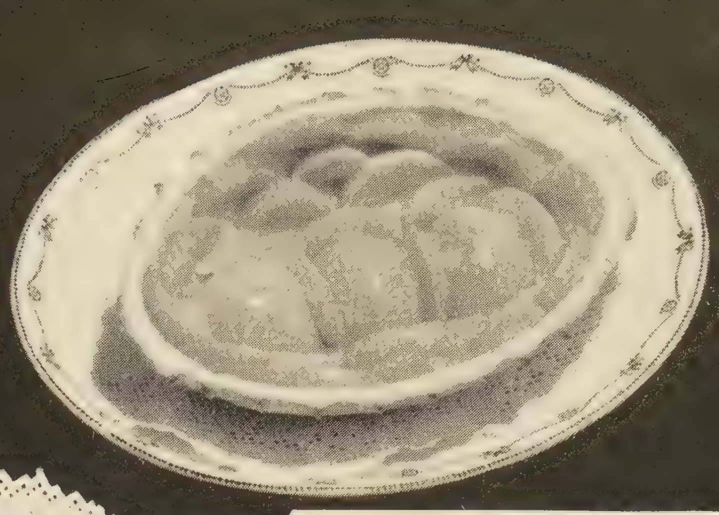


Cherry pie.



Peach flan.

Pies and Pastries

All the stone fruits make flavourful fillings for pies, tarts, and flans. The recipes given here list certain fruits in each one, but other fruits can be substituted as desired.

Cherry Pie

(Six servings)

Short Pastry

4 oz of flour
Pinch of salt
2 oz of butter
2 teaspoons of sugar
Cold water to mix

Sift the dry ingredients. Rub the butter lightly into the flour. Add a little cold water and mix until a soft dough is formed. Knead lightly and roll out. Line an enamel plate with the pastry and crimp the edges. Place a piece of greaseproof paper over the top of the pastry and fill with dried beans or peas. Bake in a hot oven (425 degrees F) for 10 to 15 minutes. Take out, remove the greaseproof paper and beans, and replace the pastry in the oven for a further five minutes. This is called baking blind.

Filling

1 lb of cherries	½ pint of water
Sugar to taste	

Meringue

3 egg whites	3 oz of castor sugar
Pinch of salt	

Wash the cherries. Dissolve the sugar in the water, add the cherries, and simmer until thoroughly soft. Beat the egg whites and salt until stiff, gradually adding the sugar and beating all the time. When the cherries are cooked strain off the juice, place the cherries on the cooked pastry, and pile the meringue mixture roughly around the top. Place in a cool oven (about 250 degrees F) until the meringue is crisp and golden at the peaks. The cherry juice may be thickened and used as a sauce.

Fruit tarts.

Peach Pie

1 lb of peaches	1 oz of sugar
Water	

Pie Crust

4 oz of flour	½ teaspoon of salt
2 oz of fat	Cold water to mix

(Six servings)

Wash the peaches and halve or leave whole as desired.

Sift the flour and salt. Cut in the fat with two knives or a pastry blender. Rub lightly into the flour until the mixture has the consistency of coarse breadcrumbs. Sprinkle 2 to 3 tablespoons of cold water over the mixture. Stir lightly with a fork until all the particles cling together. Turn out the dough on to a lightly floured board and roll out roughly to a shape ½ in. larger all round than the dish.

Turn the fruit into a pie-dish, and add the sugar and a little water. Wet the edges of the dish and roll the pastry over the top, pressing the edges and cutting off excess pastry but taking care not to stretch it. Cut two or three slots in the pastry to allow steam to escape. Bake in a hot oven (425 degrees F) for about 35 to 40 minutes until the fruit is cooked and the pastry golden brown.

Small Fruit Tartlets

Use the short pastry recipe given for the cherry pie. Line several small patty tins with this and bake blind. When cooked remove the pastry cases. These can be filled with any of the stone fruits stewed until tender and with the juice strained off. Cherries, apricots, and small plums all make attractive looking tartlets. The juice can be slightly thickened by heating and the addition of 1 teaspoon of cornflour or arrowroot mixed to a smooth paste to ½ pint of juice. Boil for a few minutes, stirring to prevent lumps. Pour this over the fruit to form a glaze.

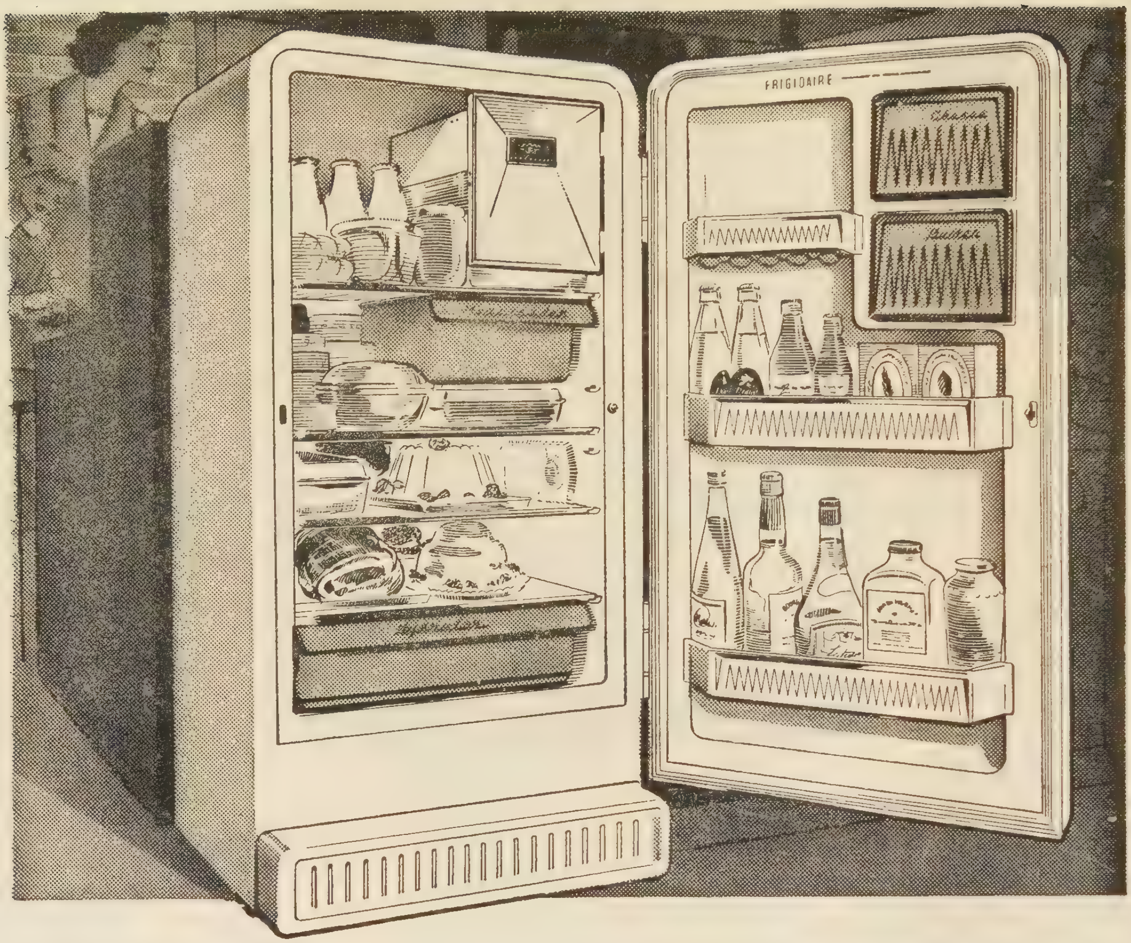
Apricot Flan

Pastry

4 oz of flour	1 teaspoon of sugar
2 oz of butter	1 egg yolk
Pinch of salt	Cold water

Sift the flour and salt. Cut or rub in the butter and mix in the sugar. Beat the egg yolk and add this plus a little of the cold water. Mix to a stiff dough. Turn out on to a floured board and knead lightly. Roll out into a round shape ¼ in. thick and about 1 in. larger than the flan ring.

Making the flan: Cover the baking tray with a piece of greaseproof paper and place the flan ring on it. Place the round of pastry inside the flan ring; press down well into place but do not stretch the pastry. Press the sides well into the ring and on to the baking sheet and trim off the edges. To bake blind prick the bottom, cover with a piece of greaseproof paper, and half fill with dried beans or peas. Bake in a hot oven (450 degrees F) for about 15 minutes. Remove the paper and filling. Return the pastry to the oven for five to 10 minutes until the pastry is cooked and golden brown. Remove the flan ring carefully and allow the pastry to cool. Arrange



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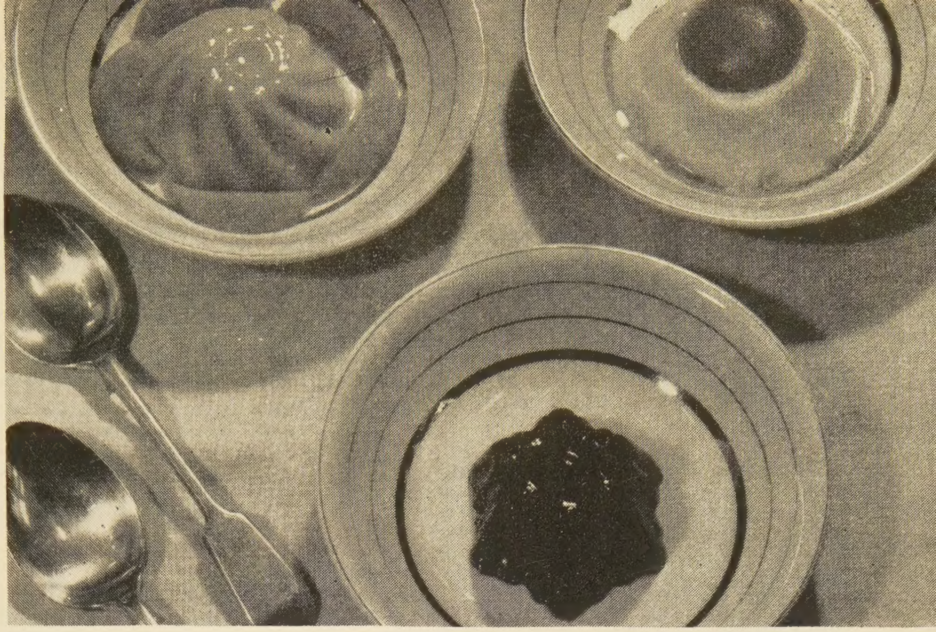
cooked or preserved apricots attractively in the case. Cover with a thin coat of red or yellow jelly, cold but not set. Allow to set and decorate with whipped cream as desired.

Substitutes for Flan Rings

A plain sponge tin may be used in place of the flan ring, though care must be taken when removing the cooked pastry not to break the base. Another method, which was used for the illustration below, is to invert an oven-proof pie-dish. Grease the top and spread the pastry over the top and down the sides. Bake the pastry on the dish. When cooked it is easily removed and, inverted, is the shape of a flan.



Cold sweets—Top left: Apricot cream. Top right: Apricot egg. Lower centre: Plum shape.

Hot Puddings

Cherry Charlotte

1 lb of fresh, ripe cherries
2 eggs
3 oz of butter
4 oz of breadcrumbs
A little almond essence
A few slices of bread and butter
2 oz of sugar

(Six servings)

Beat the butter and sugar to a cream; add the beaten eggs and three-quarters of the breadcrumbs. Mix all together and add the essence. Grease a pie-dish, line it with slices of bread and butter, and then make alternate layers of cherries and the breadcrumb mixture until the dish is full. Top it with the dried breadcrumbs. Dot with butter and bake in a moderate oven (375 degrees F) for 45 minutes. Serve hot with custard.

Peach Pudding

1 lb of fresh peaches
3 oz of sugar
1 teaspoon of lemon juice
2 oz of butter
2 oz of sugar
1 egg
4 oz of flour
½ teaspoon of baking powder
Pinch of salt

(Six servings)

Wash the peaches and halve them. Remove the stones. Put in a fireproof dish with the 3 oz of sugar, a little water, and the lemon juice. Cream the butter and the 2 oz of sugar, add the egg, and beat well. Sift the flour, salt, and baking powder together and add to the mixture. Mix well, spread this on top of the fruit, and bake in a moderately hot oven (375 degrees F) for about one hour. The cake mixture should be well risen and firm and the cake cooked underneath.

Peach Upside-down Pudding

1 lb of peaches (cooked, stoned, and sliced)
2 oz of brown sugar
1 oz of butter

Sponge

2 oz of butter
3 oz of sugar
2 eggs
4 oz of flour
½ teaspoon of baking powder
Milk to mix
Pinch of salt

(Six servings)

Grease the bottom of a sponge tin. Cream the brown sugar and butter together and spread over the base of the tin. Arrange the sliced peaches decoratively over the base of the tin.

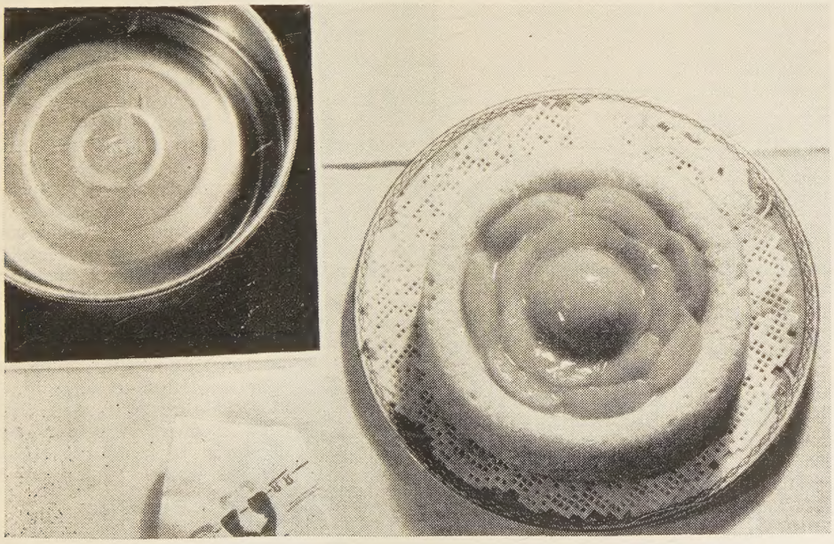
Sponge mixture: Cream the butter and sugar and add the eggs. Sift the flour, salt, and baking powder and fold into the butter, sugar, and egg mixture. Add a little milk if necessary to make a soft consistency. Pour the mixture over the top of the fruit, spreading it evenly. Bake in a moderately hot oven (375 degrees F) for about 45 minutes. When the cake mixture is well risen and cooked through turn it out on to a dish. The peaches now make a decorative top.

Sponge Flan

3 eggs
4 oz of castor sugar
1 tablespoon of water
3 oz of flour
½ teaspoon of baking powder
Almond essence

(Four servings)

Separate the eggs. Cream the sugar and yolks well together, add the water, and fold in the sifted flour and baking powder. Whip the egg whites stiffly with salt and fold in. Add the essence. Turn into a flan tin and bake at 375 degrees F for 10 to 15 minutes. When cooked turn out and decorate the top with slices or halves of stone fruits. Whipped cream may be used as additional decoration.



Sponge flan, showing (inset) the special flan tin. Additional decoration with whipped cream may be added to the fruit as desired.

Photographs by Sparrow.

Cork Tiles for Floor Covering

CORK tiles—a foot square, obtainable in three shades of the natural cork colour, light, medium, and dark—are used for floor coverings as they are quiet, comfortable underfoot, and give an illusion of warmth. They must be properly laid to be entirely satisfactory. Whether they are stuck to wood or concrete, the surface must be **perfectly smooth.**

A concrete floor must also be damp-proof because moisture rising through the concrete carries with it water-soluble materials from the concrete and can cause buckling or rotting of the tiles, or can loosen them.

Advantages

Cork tiles make a floor covering that is quiet, resilient, and comfortable to walk on. They give a feeling of warmth and provide a flooring of fairly moderate price in comparison with carpet. They do not have a slippery surface and there is less risk of breakage of articles dropped on them. They are durable, attractive, and can provide variety in pattern. Individual tiles are replaceable.

They are therefore suitable for use in living and dining rooms and in passages, and can be used effectively in a large room as a surround to a carpet square.

If the hall or passageways are subject to heavy traffic where dirt is brought in from outside, linoleum will be more easily kept clean than cork tiles.

Disadvantages

Cork tiles are rather easily injured by common household chemicals and are not recommended for a kitchen floor. They mark more easily than linoleum and tend to fade in the sun. Three coatings of plastic sealer are recommended to make the surface less porous and resist water and grease, thus giving a surface that is more durable and more easily kept clean. The sealer also helps to reduce fading. At the first sign of wear the tiles should be given another coating of sealer.

Compared with linoleum, cork tiles are poor at keeping their shape and size. Shrinkage of a floor covering under low humidity may break the adhesive bond which holds it to the floor, resulting in curling and subsequent chipping of the edges.

Cleaning

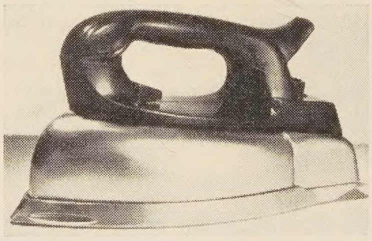
Wash the tiles regularly with a small amount of warm water and household soap or detergent. Spots may be removed with a fine emery paper or with steel wool. Avoid harsh cleaners and excessive scrubbing. Rinse thoroughly. When the floor is quite dry apply a thin coat of emulsion-type wax. Strong alkaline cleaners are particularly bad for cork and linoleum, and strong bleaches will affect the colour of most floor coverings.

—JANET W. ROBERTS,

Home Science Instructor,
Department of Agriculture,
Auckland

Care of Steam Irons

WITH reasonable care a steam iron should give years of trouble-free service. The maker's instructions should be followed closely and attention given to the following points.



Some irons have a sole plate made of stainless steel, which is resistant to abrasion and easy to clean, but most sole plates are made of an aluminium alloy, which, being relatively soft, is comparatively easily scratched. Therefore it is advisable not to iron over hooks, snap fasteners, zips, buttons, or other hard objects.

To remove starch or other substances which may stick to the sole plate use a warm, damp cloth and mild, non-abrasive detergent.

The kind of water used is an important factor. Hard water soon begins to leave a deposit inside the iron, clogging the steam passages and valve of a drip-type iron and reducing the efficiency of the boiler-type. When either type becomes clogged the mechanism that regulates the temperature is upset and the only remedy is descaling. This should be done by a qualified person.

Soft water is much more satisfactory. Rainwater, distilled water, or defrostings from a refrigerator are ideal.

The durability of a steam iron may also be affected by the material of which the tank is made, usually aluminium, brass, or stainless steel. Aluminium can be corroded by unsuitable water.

Water should not be left in the tank when the iron is not in use.

—MAUD B. STRAIN,

Home Science Instructor,
Department of Agriculture,
Dunedin

Unusual Cheese Dish from Russia

THIS unusual cheese pudding is a traditional Eastertime dish in Russia. It may be served hot or cold with cream or with a fruit sauce.

Russian Cheese Pudding or Paskha

½ lb of cottage cheese
2 oz of icing sugar
2 oz of raisins
Grated rind of a lemon
½ tablespoon of salt
2 eggs
2 tablespoons of soft breadcrumbs
1 oz of almonds
1½ tablespoons of melted butter

Sieve the icing sugar and clean the fruit. Soak the almonds for a few minutes in boiling water, then drain off and remove the skins. Chop finely or mince the blanched almonds, then roast them on an oven tray until they are light brown. Mix 2 tablespoons of icing sugar and the roasted almonds together. Press the cottage cheese through a sieve. Add the remainder of the icing sugar, 1½ tablespoons of melted butter, 2 egg yolks, ½ teaspoon of salt, and grated peel of the lemon and mix all together with a wooden spoon.

When this dough is well worked stir in the almonds, breadcrumbs, raisins, and stiffly beaten egg whites. Grease a pudding bowl and dust it with icing sugar. Fill it three-quarters full with the mixture, tie greaseproof paper over the top, and steam in a double-boiler approximately an hour.

—ELEANOR S. CAMPBELL,

formerly Home Science Instructor, Department of Agriculture, Auckland

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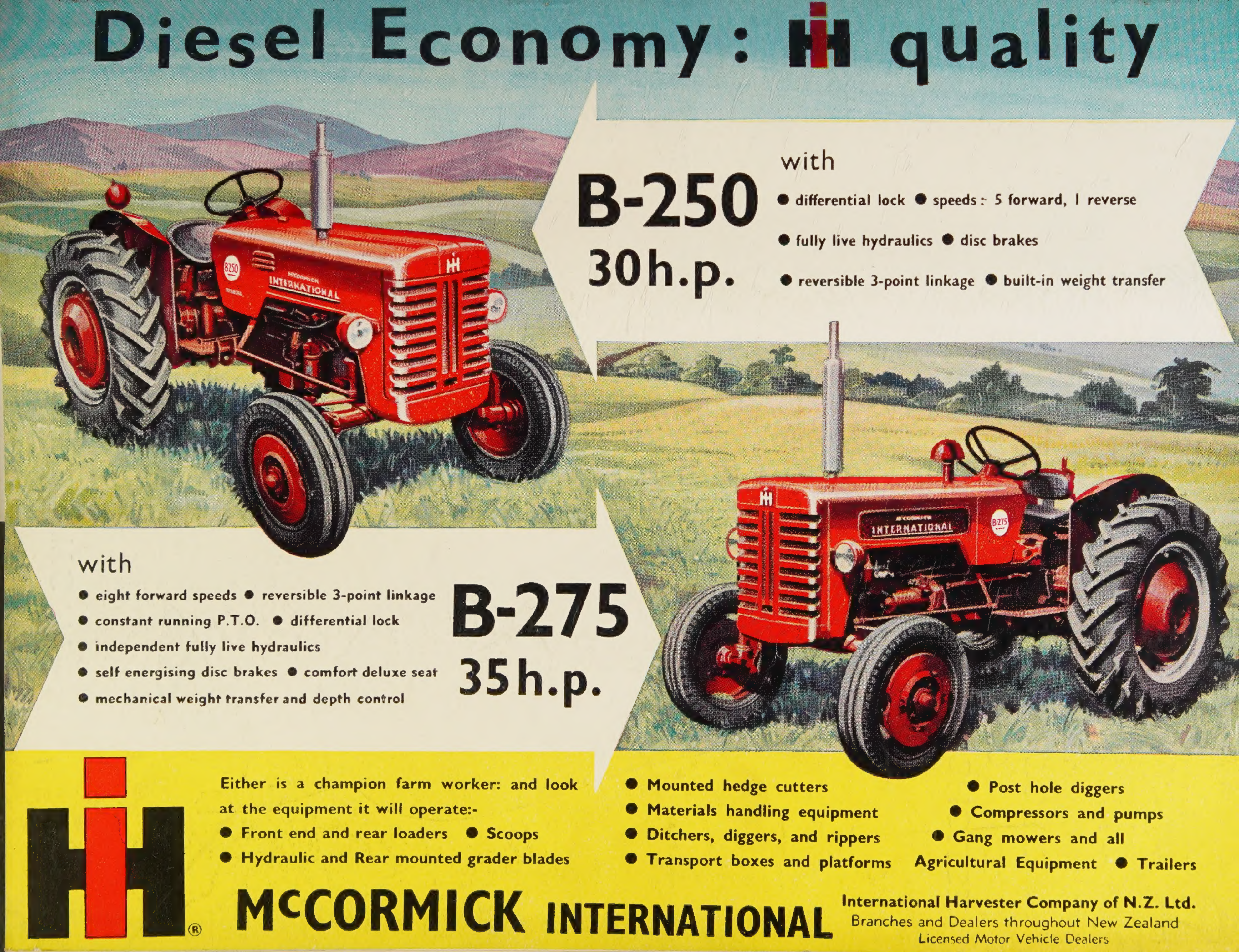

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